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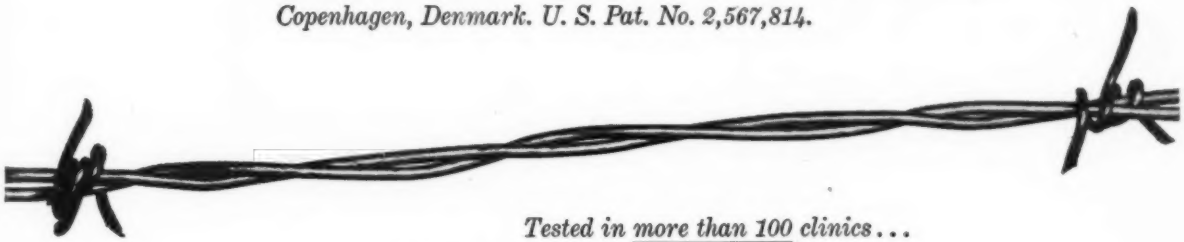

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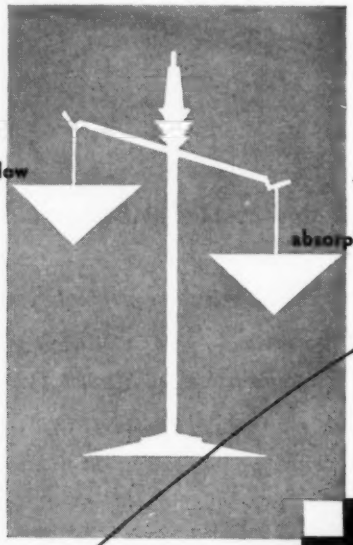

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(1) Hall, B. E.: Brit. Med. J. 2: 585-589, 1950; (2) Bethel, F. H., et al.: Univ. Hosp. Bull., Ann Arbor, Mich. 15: 49-51, 1949; (3) Spies, T. D.: J.A.M.A. 145: 66-71, 1951

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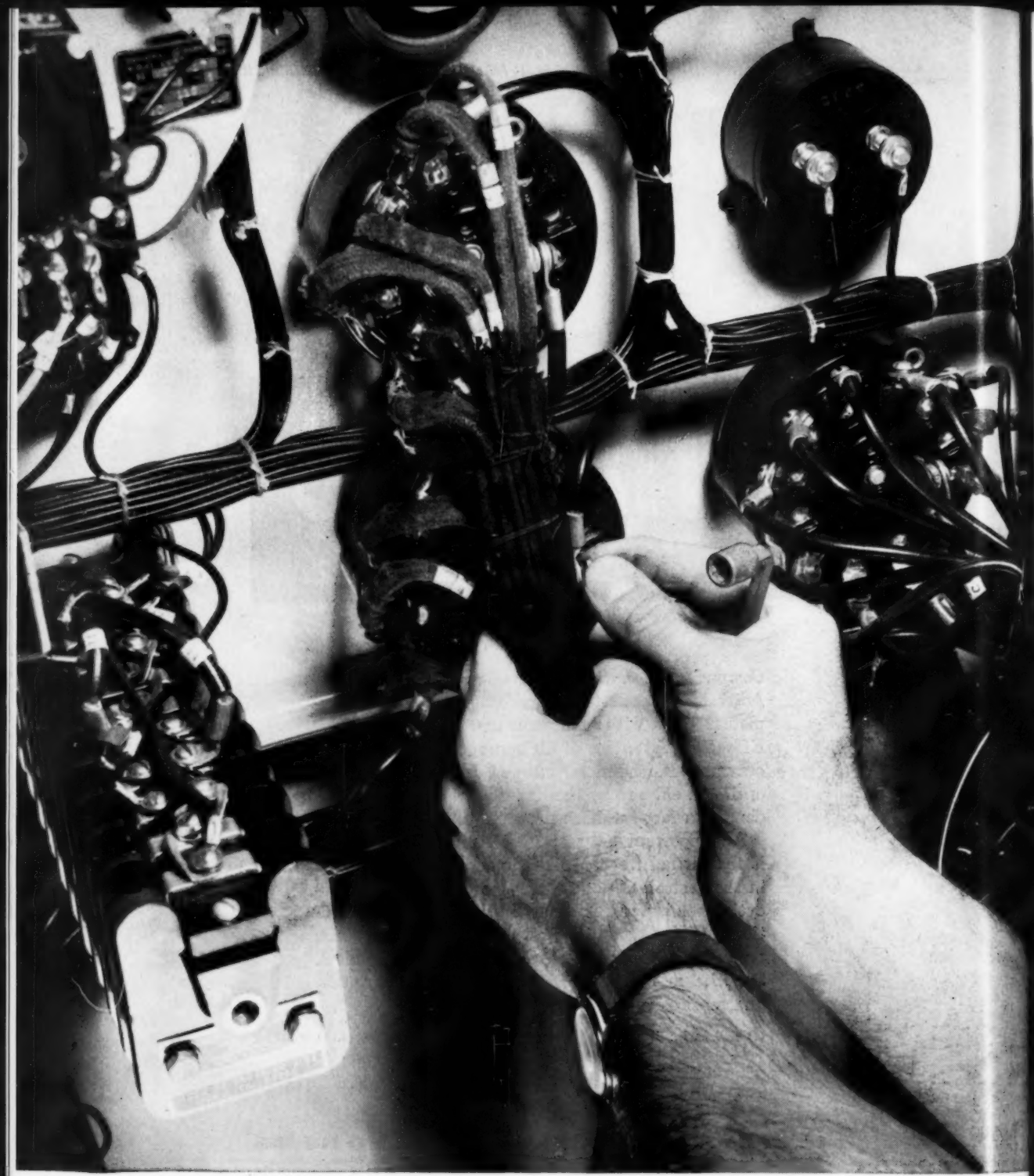

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4 Yonkman, F.F. Neurogenic Hypertension, Chemical Approaches to Its Amelioration, J. Michigan M. Soc. *50*:160 (Fed.) 1951.

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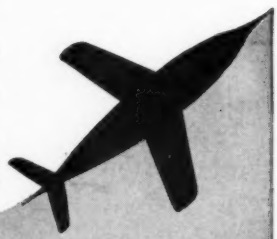

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1. Smith, A. E., and Fischer, C. C.: The Use of Carob Flour in the Treatment of Diarrhea in Infants and Children, J. Ped. *35*:422 (Oct.) 1949.
2. Kaliski, S. R., and Mitchell, D. D.: Treatment of Diarrhea with Carob Flour, Texas State J. Med. *46*:675 (Sept.) 1950.

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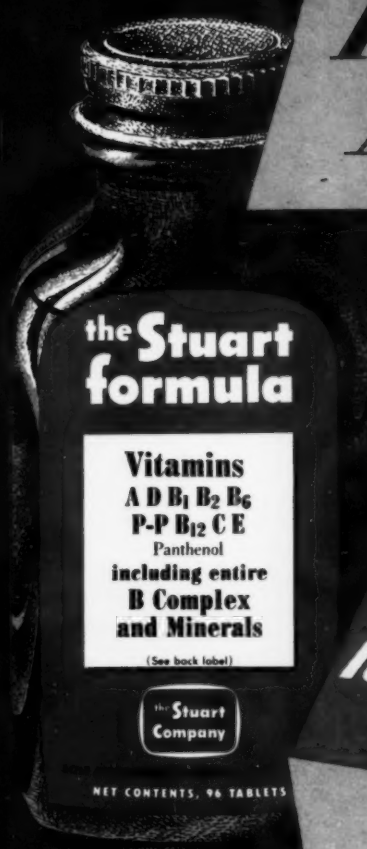

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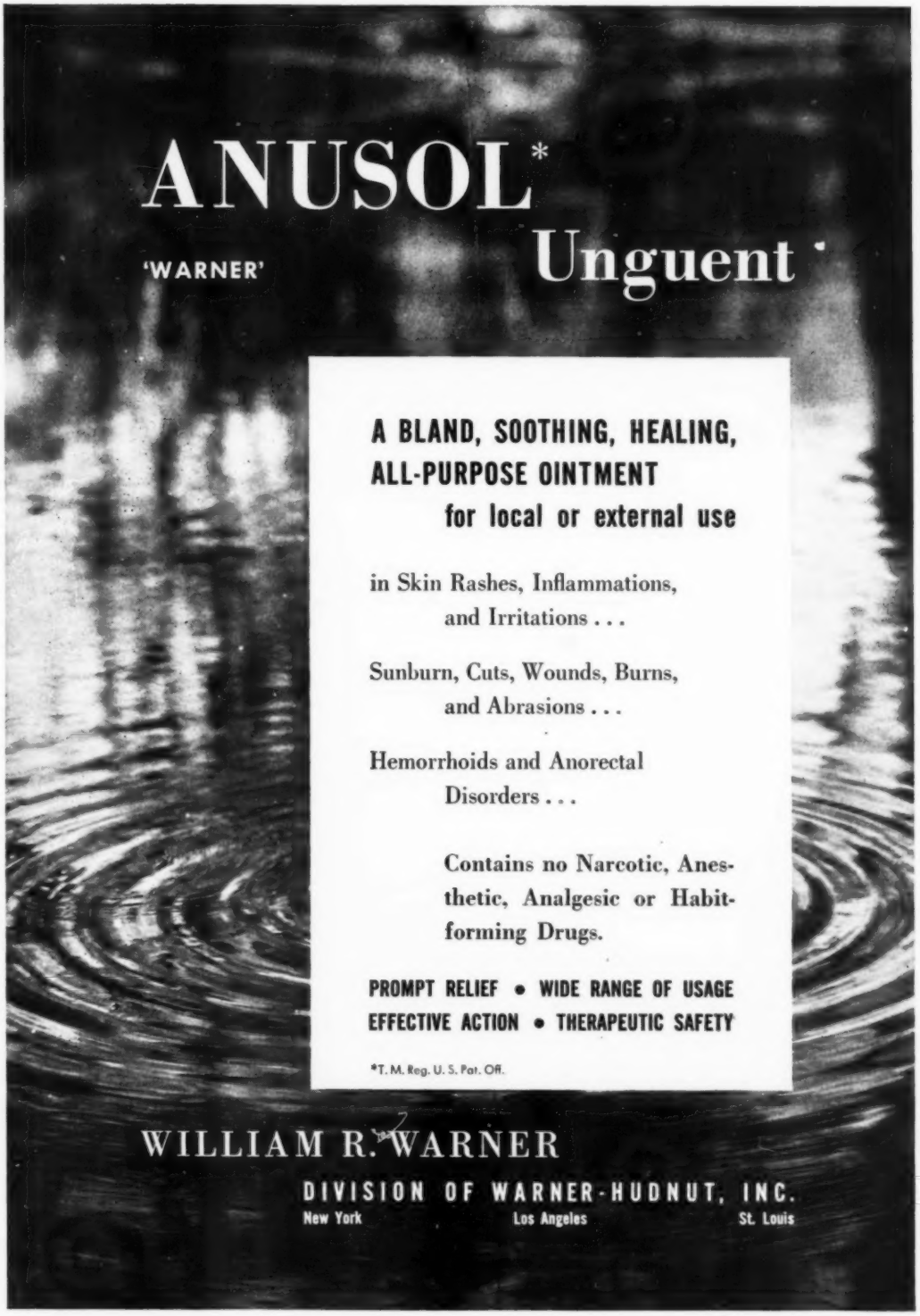
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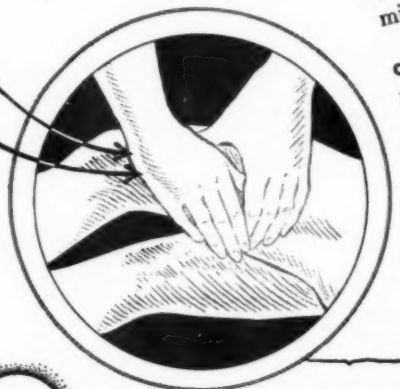

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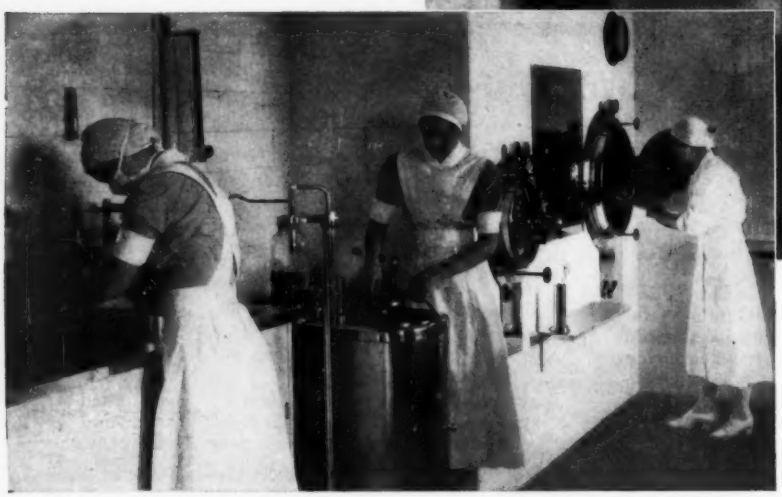

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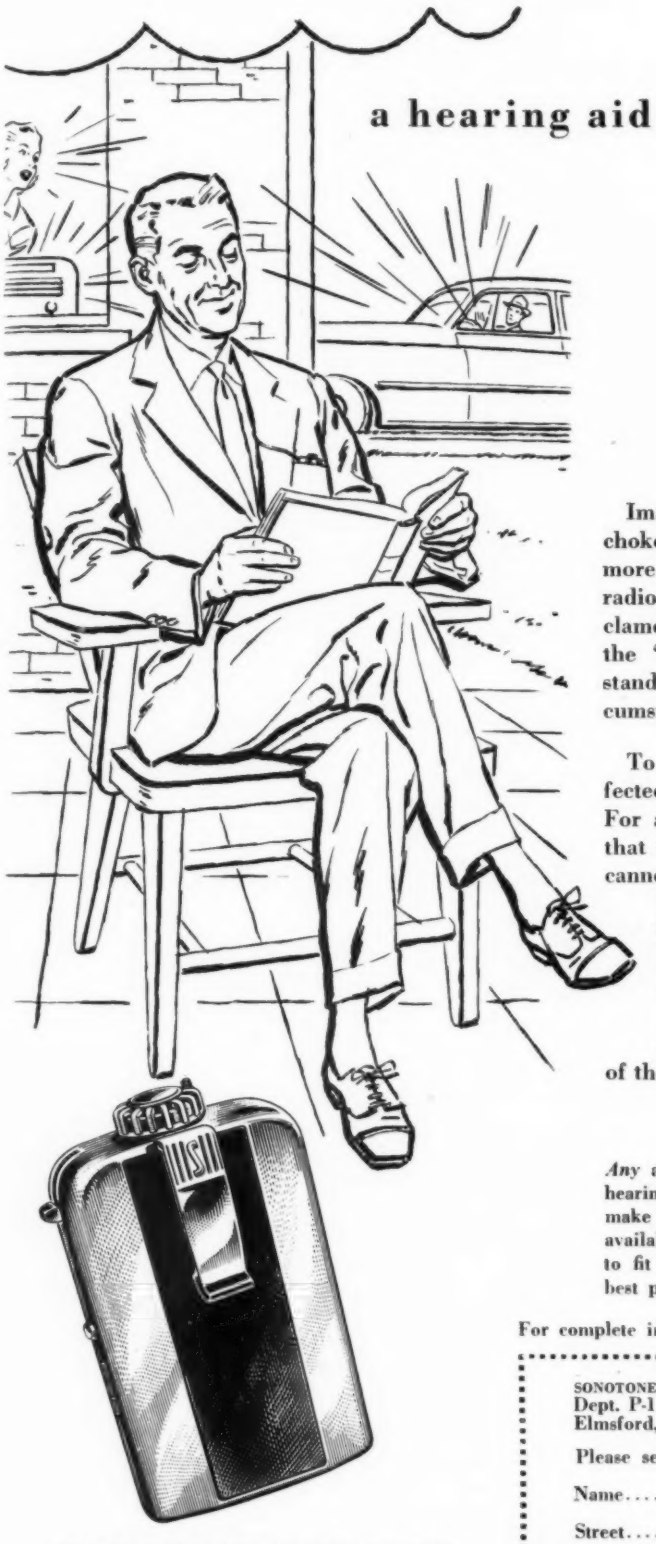

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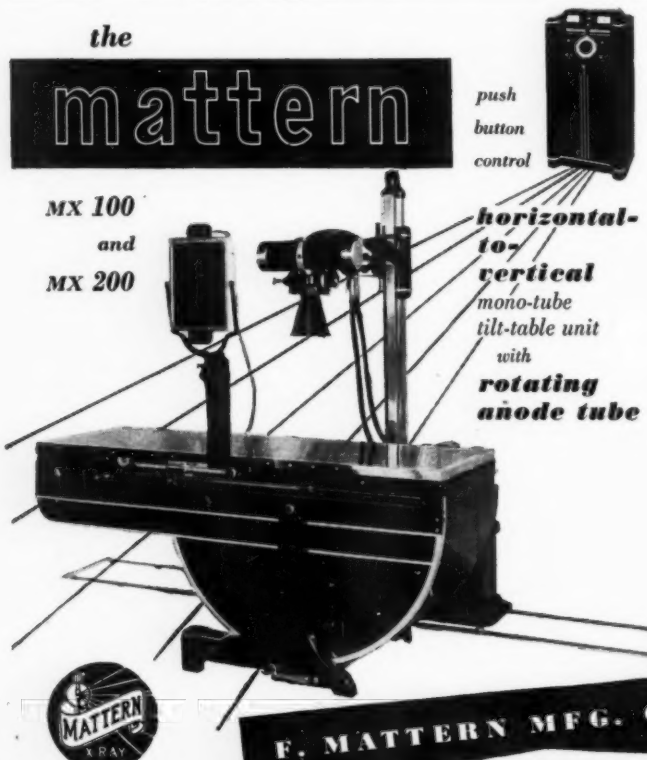

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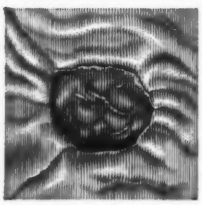

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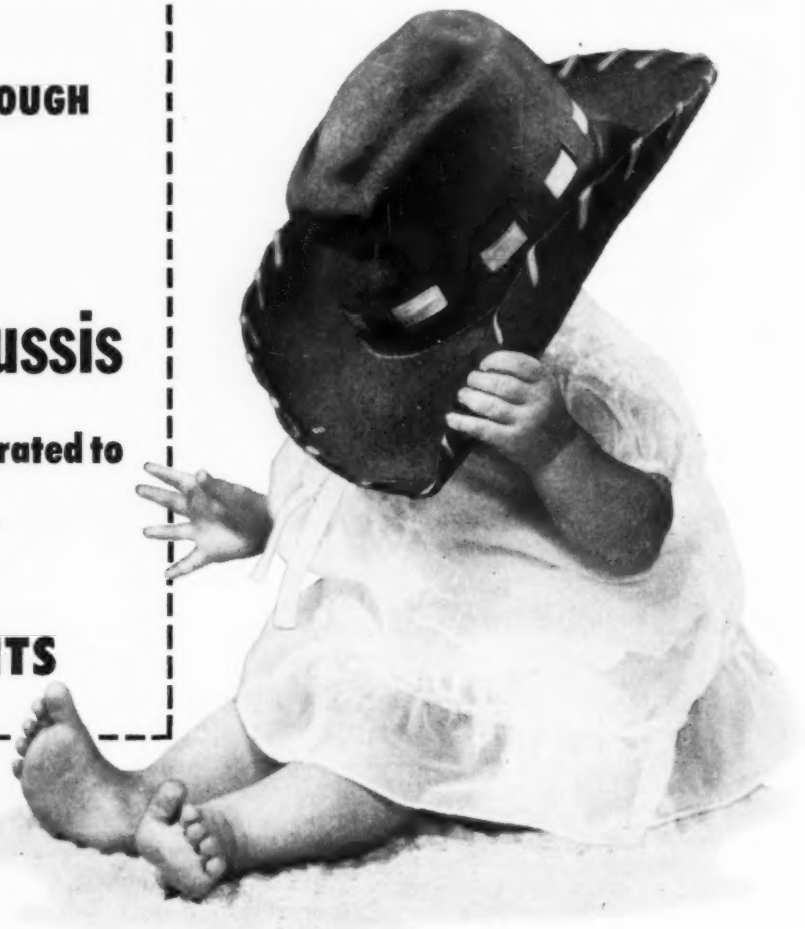

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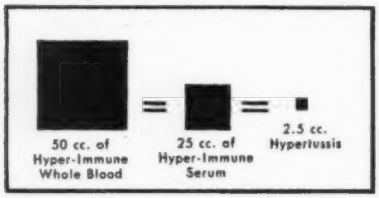

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A Progressive Structural Study of School Children

An Eight-Year Study of Children in the Rural Areas of Adair County, Missouri*

PRINCIPAL INVESTIGATOR: WALLACE M. PEARSON, D.O.

Professor of Osteopathic Principles and Technic
Kirksville College of Osteopathy and Surgery
Kirksville, Mo.

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INTRODUCTION

The progressive structural study of children in the rural schools of Adair County, Missouri, is based on a biannual visualization during 8 consecutive years of normal living of the bony structure of a group of average school children. The original application for the research grant pointed to a project continuing over a period of 8 years. The initial concept was the utilization of the structural standing x-ray film to demonstrate the age group pattern without regard to individual behavior.

The ultimate goal of this project is to obtain for review by the principal investigator, the advisory committee, and technical consultants four sets of structural standing weight-bearing x-ray studies taken at 2-year intervals, from which progressive summary opinions and statistical records can be made. These opinions and records will enlarge upon material related to the subject of body mechanics in relation to health and disease, set into the research record the school child's natural tendency, and provide an authentic approach to the structural aspects of preventive medicine.

REVIEW OF LITERATURE

Cureton[1] states, "Posture, as an aspect of physical fitness, has an enormous popular and scientific literature. Postural 'slump' indicates fatigue or poor condition and may be viewed as a barometer of muscular tone. The keen body mechanics observer may detect tell-tale signs of deep seated disability or incapacity for dynamic healthful living through a postural appraisal, noting evidences of lassitude, ptosis, unbalanced segments liable to produce strain and irritation of important nerves, and the mental concomitants or poor posture."

Schwartz[2] as early as 1927 contributed a resume of the available literature on posture. Goldthwait and his coworkers[3] listed nearly 400 references to the medical literature of posture, representing a selection of materials which relate to the book, "Body Mechanics."

Posture is a phase of body mechanics, defined by the Subcommittee on Orthopedics and Body Mechanics of the White House Conference on Child Health and Protection as "the mechanical correlation of the various systems of the body with special reference to the skeletal, muscular and visceral systems and their neurological associations."

Meredith[5] gives the following reasons for good posture:

1. Comfort and endurance in maintaining the upright posture, and for skill in other bodily acts
2. The health of the bones, joints, and muscles
3. The benefit to the organs and general health
4. Its esthetic value
5. Its psychological effect
6. The impression it makes upon others.

Cowell[6] points out that mental attitude toward life, comrades, work, and self is strongly colored by the state of health. It is maintained that physical poise is related to mental poise, motor attitude to mental attitude. A state of happiness and well-being is indicated by facial expression, muscular tonicity, increased peripheral circulation, and good bodily posture. The opposite, typified by the hanging limbs and the flaccid facial and trunk muscles of the down-and-out individual or the chronic dyspeptic, is well known. Attractive and efficient posture has long been associated with desirable personality traits. The attitude of attention is characterized by "tension" of the muscles, in which muscular tone is increased. A well-conditioned

*Research project sponsored by the Committee on Research of the American Osteopathic Association carried out with the aid of the personnel and equipment of the Kirksville College of Osteopathy and Surgery. This paper is based on a report made to the Committee, December, 1950.

†Received D.O. degree from Kirksville College of Osteopathy and Surgery, January 20, 1951.

body makes possible good posture, the emotional concomitants of which might well be self-respect, pride, self-confidence, and courage. Weak muscles, poor posture, and weak will are frequently considered as likely to be found in the same individual.

Burnham[7] supports the relationship of posture to efficient brain activity and especially suggests that posture may condition definite emotional tendencies and habits of mental activity. Kretschmer[8] emphasizes the interplay and correlation of physique, posture, and character. Sherrington[9] found bodily posture dependent upon the muscular tonus acquired through the activity of the proprioceptive system, thus giving sensation of and perception of posture. Kempf[10] states that there is a close interplay between the sensory and motor nerve circuits. The postural tonus of muscle is influenced by the autonomic sensorimotor apparatus; the muscle serves both as a receptor and effector. Sweigard[11] stresses the fact that each individual is a bundle of motor habits; that all posture, relaxation, and directed movement are results of training the neuromuscular system; and that as long as one can think, motor habits can be changed. Students of the physiological and psychological aspects of posture place great importance upon conditioned reflexes acquired as a result of postural training.

Deaver's study[12] relating the A, B, C, D silhouette grades of posture according to the Harvard scheme with intelligence (r=.014), grade points (r=.002), personality ratings (r=—.008), auditory-sensory reaction (r=.055) on 343 normal college students gave insignificant findings. Likewise, Gunkler's study at Berea College[13] relating body mechanics grades to scholastic standing (r=.068) and to intelligence (r=.049) shows a similar relationship. These studies have not measured a number of the aspects mentioned previously in this review, and the body mechanics measures and statistical procedures used were not good enough to bring out the relationships of muscle tone to intelligence or personality traits. The relationships which are undoubtedly present in extreme postural cases are lost in nonselective statistical studies. The case study technic needs to be more fully applied to this area.

Biologists offer evidence that the behavior of animal organisms at any given moment depends upon their physiological state, meaning the active physiochemical process. The works of Dickson,[14] Goldthwait, and others may be cited as giving good summaries of the relations between posture and health, stressing anatomical and physiological relationships. Goldthwait and his associates[3,15,16,17] emphasize keeping the chest free to breathe with a relatively full excursion of the diaphragm in all postures so as to guarantee good circulation. Their materials clearly show that this is impossible with a slumped chest; the circulation to vital organs is retarded because of poor breathing and mechanical blockage. The great importance of head posture is stressed because the suspensory ligament attached to the cervical vertebrae draws up on the heart, diaphragm, and attached viscera. Good head posture requires constant cultivation of tonus in the posterior neck and upper back muscles. Gastric ulcer and postural diabetes are traced to poor posture, as are gastroptosis and enteroptosis. All longtime students of this problem, including Kellogg,[18] Dickson,[14] and Mosher,[19] describe the harmful effects on health in visceroptosis. Patients with extreme visceroptosis show lack of stamina in ordinary activities, are usually constipated, and complain of malaise, migraine, headache, offensive breath, and anorexia. They are commonly nervously exhausted and irritable people who suffer from insomnia and inability to concentrate.

Reynolds and Lovett[20] investigated low-back pain in women and concluded that it is associated with marked lordosis, with flat back, or with diseases and displacements of the pelvic viscera.

Parvy[21] as early as 1885 insisted that strain and fatigue in the upright position, usually associated with lordosis, caused albuminuria, and brought out the fact that night urine was usually free from albumin. Albuminuria disappears with elimination of the lordosis in some cases. This condition is thought to be associated with the disturbance of the sympathetic ganglia or the renal veins which lie close to the lumbar spine. Some authorities think that the albumin is the result of toxemia due to fatigue. Patients with orthostatic or lordotic albuminuria are usually extreme ectomorphs, pale, anemic, and underweight. They complain of palpitation of the heart and very frequently show skin disorders related to nutritional disturbances, such as eczema.

Cyriax[22] points out associations between dorsocervical posture deficiencies and cardiac disease. Carnett and Bates[23] pointed out that the most common cause of neuralgic pain or tenderness, especially in individuals under 30 years of age, is excessive lordosis which is thought to pinch the spinal nerves as they pass through the intervertebral foramina. Tenderness or pain from this cause may occur anywhere in the body but is fairly common in the scalp, abdominal wall, and feet. The pain has been shown to disappear in certain cases when the lordosis was eliminated.

Intestinal stasis has been suggested by numerous writers as a causative factor in arthritis. The investigations by Dickson[14] and Goldthwait and others[3] show that gastrointestinal disturbances must certainly be considered as a possible factor in chronic polyarthritis with multiple joint involvement and periarticular enlargements. (In these cases there is imbalance in the ileocecal flora.)

The relationships of body build to health and the close connection of constitutional type to heredity suggest a strong relationship between posture and health. Posture needs to be appraised and interpreted with consideration of its relationships to body build of a permanent constitutional nature.

Man's posture has gradually evolved from that of his quadruped ancestors. Many writings have been devoted to this development including those of Bowen,[24] Clevenger,[25] Baker,[26] and Morton.[27] Many body structures were primarily designed for use in the horizontal position, as analysis of the anatomicomechanical arrangements in the spine, the veins, the appendix, the breathing apparatus, and the feet indicates. The lumbar curve of the spine and the arches of the feet have developed to meet the needs of the erect position and bipedal locomotion.

The type of bony structure determines, to quite an extent, the posture of the body as a whole or of any particular segment. Rogers[28,29] emphasizes the long view of posture, stressing the dominance of hereditary morphology:

> There is no evidence whatsoever that the style of carriage we happen to have been born with can be changed to a

straighter model. There is no evidence of a relation of mentality or morality to carriage unless it be from some underlying cause affecting both physical and mental condition.[28]

There is no evidence whatsoever that posture is essentially influenced either by general or by special posture exercises—there is ample evidence that, like all our other features, physical and mental, posture is an inherited trait bound up with the complicated physique handed down through millions of years and not to be tampered with lightly for artistic purposes.[29]

Studies by McCloy,[30] Howland,[31] and Boynton[32] lend support to the idea of morphological dominance due to heredity. McCloy concluded that wider vertebrae give straighter spines and narrow thoracic vertebrae give greater relative kyphosis. The Howland and Boynton x-ray studies of the pelves of women show that the relatively high, shallow pelvis produces a hyper-flat back, the extreme opposite of lordosis. It is the deep type of pelvis that produces marked lordosis.

Damany[33] and others have shown that the angular measurement of the femoral head in its relation to the shaft and to the acetabulum shows wide differences among people of the same age. These relations affect lordosis and the degree to which the feet toe out or toe in. A standard position would require standardization of the angular relations in femoral torsion, which is impossible. Some people are not structurally adapted to standing or walking with the feet straight ahead, even though external mechanics might suggest better application of force from the straight ahead foot.

Bryant's 300 autopsy records[34] showed the extreme ectomorphic type to be subject to ileal stasis and intestinal adhesions. Bean,[35] in observing 1,002 patients and 311 autopsies concluded that in this type the stomach was small, long, J-shaped, and far to the left. The liver was small, low, vertical, and far to the right; the intestines were small and short. The colon was long with a low hepatic flexure and high splenic flexure, low-placed transverse colon, and long mesentery. The arrangement of these organs obviously affects their internal posture.

Schwartz, Britten, and Thompson[36] found no appreciable relationship between the type of build (as judged by the relations between height, weight, and abdominal circumference) and posture as they measured it. This study should not be considered final on this problem because the indices used for body build do not reflect many of the specific items of posture accurately enough to settle the issue.

Cureton and coworkers[37,38,39] have critically reviewed the literature on the methods of measuring anteroposterior posture covering a great variety of methods. Many methods are defective because the measurements were made over soft flesh, were influenced by compensations in the body segments, or were based upon debatable assumptions such as: the straighter the spine, the better the spine or measurements made outside the body are valid for inside interpretations. Posture measurements have been most confused and one is literally astounded to see the great amount of work that has been done on the subject.

There is no doubt about two points which would seem to justify posture measurements: (1) That the individual differences can be measured reliably on at least ten important aspects of posture and (2) that measurements and photographs are highly motivating to the subjects.

The methods may be grouped into two principal approaches (including only standing posture):

1. Subjective judgment by experts, holding in mind criteria of good and poor posture
2. Objective photography or measurement and scaling the scores on specific items or combining the scores into a composite or average rating.

Clarke and Shay[40] have published an improved method of measurement of lateral spinal curves.

Carey[41] constructed a model which reproduces the scoliosis curves and said that "Scoliosis is a spinal sign of the muscle-tone imbalance and is not a specific disease entity."

Carnett and Bates[23] state that "Improvement in body mechanics is directly dependent upon and proportionate to the amount of time in which the individual holds his body in the corrected position." Postural exercises no doubt have a conditioning value. Any person, knowing a good set of postural exercises may do them at home, in the office, and throughout life. Special equipment, personnel, gymnasium, or costume is not required and organizational restrictions do not interfere. In general, such exercises aim to strengthen, tone, and develop a kinesthetic sense of good posture for the muscles controlling the head, chest, spinal curves, pelvis, and feet. McCurdy[42,43] has given some good suggestions for exercises as have a number of other writers.[3,4,31,44-49]

Conclusions.—The evidence shows strong relationships of posture to health but these concepts must not be applied within too narrow limits, except for preventive purposes. Causes of poor posture are multiple but many of them not dominated by hereditary morphology are subject to modification through education. Certain basic principles are known, but further research is needed concerning the quality and quantity of corrections and the learning induced. Margaret S. Poley[50] stated:

> It is commonly said that no two human bodies are alike and that the ways in which they differ are endless. Hippocrates, long years ago, observed:
>
> "Some are hollow, and from broad contracted into narrow; some expended, some hard and round, some broad and suspended, some stretched, some long, some dense, some rare and succulent, some spongy and of loose texture."
>
> • • •
>
> The only means for studying the bony structure of living people is through the use of x-ray films. This procedure is relatively expensive and hence has not been utilized to any great extent on normal individuals. . . .

Wiles[51] points out that the posture of the hip joint is the key to the posture of the whole body because it determines the pelvic inclination which is the foundation upon which is erected the spinal column and the rotation of the legs which is determined by the posture of the feet.

Wiles method of measuring the pelvic inclination uses arbitrary points selected because they are easily palpated. The method is rapid and accurate within acceptable limits. The points selected are the upper border of the symphysis pubis and the posterior-superior iliac spines. One inclinometer blade is placed at the midline at the level of the posterior superior spines and the other at the upper symphyseal border; after adjusting the instrument to make the plumb-bob parallel with the plate, reading is made.

The average pelvic inclination determined by this method is 31 degrees in males and 28 degrees in females. Variations of as much as 4 degrees on each side of the average are considered to be within the "normal" range. In infants the pelvis is more horizontal and inclination increases with growth. It is

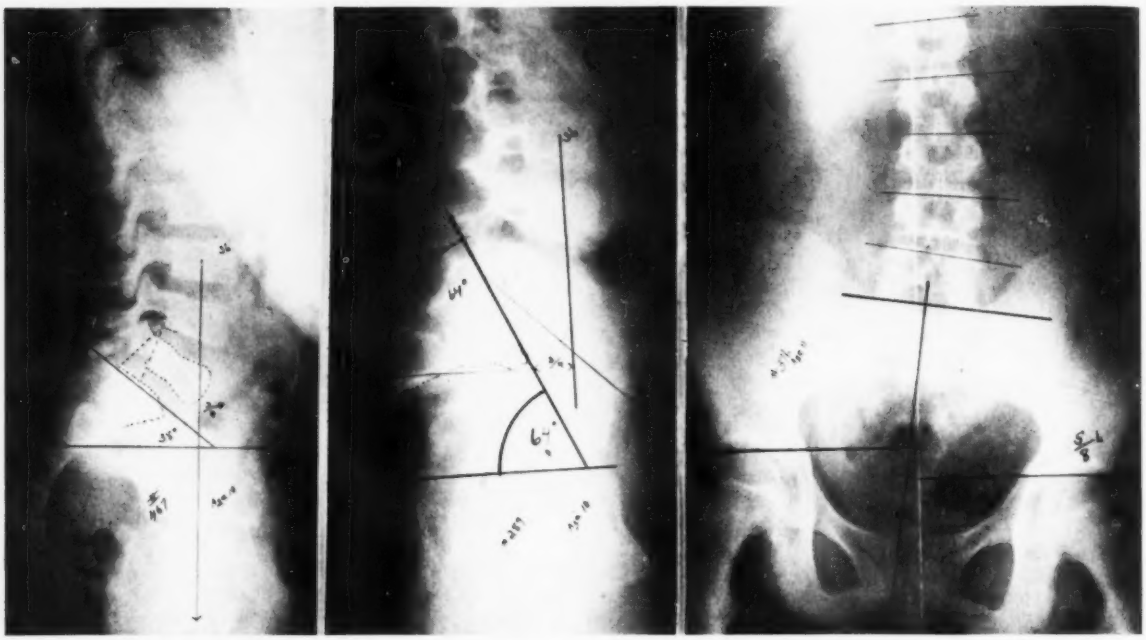

Fig. 1 Fig. 2 Fig. 3

Examples of anatomical variations: Fig. 1. First degree spondylolisthesis. Fig. 2. Sixty-four degree sacral angle. Fig. 3. Five-eighths inch lowness of left femur head, sacral type I A.

about 22 degrees at 4 years of age and about 25 degrees at 7 years in both sexes. The adult angle is reached around the tenth or eleventh year and then the sex variation first appears.

Grossman[52] stated that after a child begins to lift its head at the age of 3 or 4 months the cervical spine changes to a position of lordosis. At the end of the first year, when the child begins to walk, the muscles of the back arising from the sacrum and inserting into the lower dorsal region of the spine shape the spine into a position of lordosis in the lumbar region. Thus the original kyphotic spine acquires a lordosis of the cervical and lumbar regions and a kyphosis of the dorsal region.

Klapp[53] said that if the body of man were completely adapted to the erect posture, postural disease would not occur, and points out that primitive people suffer none of the diseases such as scoliosis, varicosities, et cetera, the etiology of which goes back to the erect posture.

Dickson[14] reported that in 1915, 20 per cent of the children under 12 years of age at the orthopedic outpatient department of the University of Pennsylvania had some postural defect and that in Boston hospitals 44 per cent of the children seen had some static foot trouble.

R. J. Cook[54] examined 2,200 Yale freshmen and found 25 per cent with normal spinal curves, 50 per cent with scoliosis, 55 per cent with lordosis, 56 per cent with flat chest, and 42 per cent with prominent abdomens.

Brown[55] reported that of 476 Harvard freshmen examined, 6.7 per cent were found to have grade A posture while 80 per cent had poor posture.

E. Blanche Sterling[56] examined 1,115 children in the first six grades of school in studying the relation between nutrition, physical defects, school grade, and physical training, and found that 29 per cent of the children had good posture, 40 per cent fair, and 31 per cent poor.

Lillian M. Towne[57] found lowered shoulders in 23 per cent and gorilla-type posture in 30 per cent of students at the Montreal High School; 14 per cent of all the students at McGill University had similar deformities.

The Life Extension Institute,[58] in its examination of industrial groups of more than 10,000 people actively engaged at work, found 44 per cent with generally faulty posture. Among 760 cases of low-back pain in the clinic of the Massachusetts General Hospital, a large number were due to attitudinal disturbances.

In 1740, Nicholas Andry,[59] the aged dean of the Faculty of Medicine of Paris, defended his thesis "Orthopaedia." His contention was that many of the ills of children had their source in imperfect body mechanics, as we now use the term. Andry's thesis presents one of the earliest appeals for preventive medicine through the detection and the normalization of the structural factor related to the ill health of children.

PURPOSE OF THE ORIGINAL GRANT

This study is characterized by being a progressive, biannual visualization of the average school child's bony structure during 8 consecutive years of normal living. Poley[50] has stated that the only means for studying the bony structure of living people is through the use of x-ray films.

The study was undertaken with the hope of setting into the records of osteopathic medicine a new contribution to the structural analysis of structural problems. The origination of the concept of the need for this type of study came through the experienced belief that preventive medicine encompasses the prevention of poor body mechanics with its associated

Fig. 4

Fig. 5

Fig. 6

Examples of anatomical variations: Fig. 4. Hemivertebrae. Fig. 5. One-half inch lowness of right femur head, sacral type I A. Fig. 6. Second degree spondylolisthesis.

segmental influence on health. The efficient approach seemed to be through progressive studies of children as they normally develop.

The project was committed to a plan that was sound but different from any set forth in the voluminous literature related to the subject. No project has dealt with a political school unit. None has scheduled standing x-rays at 2-year intervals over a period of 8 years. When x-ray examination has been a major examination procedure, the units have been special groups, for example, college women, patients presenting low-back pain, industrial groups, children in orphanages, indigents, et cetera. This project deals with all rural school children in Adair County, Missouri. The study was stimulated by a lack of available literature on structural examination of the spine, pelvis, and supporting surfaces of the lower extremity in the individual who is sufficiently free of symptoms to be classed as average normal and of such an age as would represent the developmental stages of the treatment-demanding person. The natural assumption seems to be that the patient getting treatment for symptoms was at one time normal because he was symptom-free. This study is aimed at finding if a relationship exists between the mechanical faults of children and those of symptom-expressing adults.

It is possible that standing weight-bearing x-ray studies of children may become an accepted routine in public health examinations along with chest films, dental checkups, and immunization. When the age for the earliest practical detection of basic structural defects is established, the normal progress of these defects determined, and the basic pattern established, a study of corrective procedures could be made.

It is presumed that if structural errors, anomalies, and developmental faults are present in children in the first grade and remain evident through the eighth grade without spontaneous correction, they will be present in the adult. It is also presumed that if these mechanical problems threaten the health, the occupational activity, and the well-being of the adult, the time of greatest concern should be in childhood. Structural care then becomes preventive medicine.

The Progressive Structural Study of School Children is aimed at fact finding, the establishment of structural visualization from which many other projects can develop. The study aims at seeing what exists, rather than what results from experiment or therapy.

MANAGEMENT OF THE PROJECT

Getting this research project under way was difficult. The first hurdle came in setting up machinery in the local school system for scheduling children with the x-ray department. There had been so many school examinations that both students and parents were resistant. An offer of a free chest film was made, but the offer produced only a few studies.

During the war years getting films was a problem. A few cases were studied in order to develop a technic of child management and to determine what combination of films would best answer our purpose, but until September, 1948, only $113.00 had been used from the original appropriation.

In the course of examining avenues and measures to provide a political-educational-unit of school children, Vernon H. Casner, County Health Officer, suggested that we study rural school children and accepted the responsibility of seeing that they were scheduled in the Clinic at regular intervals. Through full cooperation of the superintendent of schools for Adair County and Dr. Casner, 831 children were available for the study. Only 27 in the entire county school system failed to report for a structural study, a chest film, and a physical examination through the facilities of the Clinic of the Kirksville College of Osteopathy and Surgery. Much credit must be given for the suc-

cess of this project to the late County Superintendent, Mr. Otis Hills, and George W. Rea. Reviewing the films from the structural research viewpoint has been done by James A. Keller, C. K. Smith, and Wallace Pearson.

The County Superintendent and the County Health Officer scheduled the appointments. About 50 children, accompanied by a suitable number of parents and teachers, were brought to the Clinic on the school bus each Thursday and Friday. They were given the public health examination outlined by the Department of Health and the Department of Education. Small groups were gowned under the supervision of a teacher or parent and then taken by twos to the x-ray department for their "picture." Handling school children is an art gained only by tedious experience. In 1949-50, the children looked forward to the trip to Kirksville and many parents came along for the "outing."

In 1940 Adair County, Missouri, had a population of 20,246 of which 49.8 per cent (10,080) was urban. The population per square mile was 35.3. There are 68 rural schools in Adair County; 13 of them transport their students and are not considered in this survey. The rural school enrollment was 831 in 1947-48, 915 in 1948-49, and 820 in 1949-50. Enrollments in schools range between 36 and 3. The economic level varies somewhat between pupils, but not between school groups. The only losses from this study have been from an increase of transporting schools (10 to 13) and the natural school census alteration from year to year.

The first year series resulted in the need for many rechecks. The second year only studies of new children entering school, rechecks of structure, and rechecks of chests were made. The third year (1949-50) the second full survey was made and is now completed. The fourth year (1950-51) project, in which only new students are being examined and rechecks of structural study and chest films are being made, is under way.

TABLE 1—DISTRIBUTION BY AGE AND SEX OF RURAL CHILDREN EXAMINED IN PROGRESSIVE STRUCTURAL STUDY

Age	1947 Series			1949 Series		
	Male	Female	Total	Male	Female	Total
5	17	18	35	5	3	8
6	52	38	90	44	50	94
7	56	38	94	47	46	93
8	37	37	74	53	45	98
9	36	50	86	52	43	95
10	46	39	85	38	47	85
11	41	42	83	33	47	80
12	43	42	85	38	37	75
13	46	36	82	36	26	62
14	11	1	12	10	5	15
15	5	3	8	4	1	5
16	0	1	1	0	0	0
17	1	0	1	0	0	0
Total	391	345	736*	360	350	710*

*These figures represent the number of examinations completed rather than the number of children reporting for examination.

PROCEDURES AND RECORDS

Procedure in Making Weight-Bearing Structural Film Study.—

1. The child wears a gown and all ordinary clothing is removed.

2. The child is placed in the standing position before a vertically placed tilt table.

3. The target-film distance is maintained at 39 inches (the maximum distance for the equipment used) and the tube centered 2 inches below the umbilicus in midline.

4. The child is given a brief period for orientation.

5. The feet are placed with the heels at equal distances from a mid-heel line which has been established at the floor end of a plumb-line, coincident with the mid-film line and at right angles to the lower margin of the cassette. The medial heel border is about one-half inch from the established base plane line. The medial surface of the ball of the foot at the plane of the distal end of the first metatarsal is approximately 1½ inches from the established base plane line.

6. The knees are extended by pressing them back against the vertical table surface.

7. The posterior areas of the body surfaces are in contact with the table surface. The only manual positioning is placing the feet.‡ The child forms the stabilizing contact with the vertical table surface from a standing free and relaxed position.§

8. An anteroposterior exposure is made on 14x17 film.

9. The child steps out of position and is placed for a lateral standing study.

10. The feet are placed approximately 3 inches apart with the mid-malleolar line coincident with the established mid-film line. The shoulder is in contact with the vertical table surface following a brief orientation period. The hip does not touch the table surface following a brief orientation period. The hip does not touch the table unless by anatomical necessity. The hands are placed on a bar at shoulder level. The lateral exposure is made on 14x17 film. Target-film distance and tube centering is the same as for anteroposterior study.

Developing.—The exposed films are permanently marked with the date and the child's name and number. A series of numbers are allotted to this project. A record book is used in which the numbers and names are recorded by school and by year.

The films are taken from the cassettes in order to have cassettes available for the day's work. The films are processed at night and the next day are placed in envelopes by schools after the film record has been checked.

Reviewing Films.—Three people work efficiently in reviewing films. One rules the films and reports his findings; one makes the record on a sixty-column ruled ledger sheet; and one gets the films, puts them on the view boxes, checks the x-ray department record book, and puts the film back in the school envelope. One person working alone proceeds slowly and tediously.

Check on Film Review.—During the 1947 review, 100 films, selected by taking numbers divisible by five, were reviewed independently of the previous record to establish possible variations in interpretation by

‡The positioning of the child's feet may constitute a debatable technical point. However, since the films in this study are to be used for comparison, this rule has been established to maintain consistency.

§Free-in-space standing studies have been repeatedly checked against stabilization studies. Contact stabilization gives adequate film detail with no apparent alteration in anatomical and structural readings and in dealing with children has outstanding advantages.

the same people from day to day. In no case was there an alteration in the mathematical record of more than 5 per cent or a variance in opinion that would alter interpretation.

Check on Individual Review.—During the 1947 review, a series of 50 film sets were ruled and reviewed not by the original reviewers, but by others with parallel experience in structural film analysis to establish the variation in trained understanding from one person to another. No mathematical discrepancy greater than 4 per cent resulted and the interpretation of factual evidence was consistent, varying only in the extent of detail.

Reports to Parents.—Only in problem cases and in those with positive chest findings are reports made to parents. To maintain an ethical patient-physician relationship, the parent is advised to consult the family physician for treatment. The form used to report to parents is the standard form furnished by the Department of Public Health and Welfare of Missouri.

Line Record.—The following points are covered in making the record for each child:

1. Number
2. Name
3. School
4. Age
5. Date
6. Femur head low
   Right: ⅛ 1/16 ¼ 3/16 ½
   Left: ⅛ 1/16 ¼ 3/16 ½
7. Sacral Type
   I A B C D
   II A B C D
   III A B C D
   IV A B C D
8. Scoliosis Apices
   Right — Left
9. Rotation
10. Lateroflexion
11. Sacrum Anomaly
    Right — Left
12. Facet Anomaly
    Right — Left
13. Lumbar Anomaly
    Right — Left
14. Neural Arch
15. Other
16. Sacral Angle
    40° or less
    41° or more
17. Lordosis
    Degree
18. Flat Lumbar
    Degree
19. Silhouette
20. Disk Space
21. Film Advice
    Retake
22. Anomaly
    Spondylolisthesis, 1-2-3-4
23. Neural Arch
    Upper sacral segment
    Fifth lumbar
24. Transitional Sacrolumbar
    Unilateral
    Bilateral
25. Congenital hemivertebrae
26. Asymmetric lumbosacral facet
27. Persistent vascular channels
28. Coxa valga — vara
29. Acetabular
30. Bone Diseases:
    31. Kümmell's
    32. Pott's
    33. Compression
    34. Legg-Perthes'
    35. Scheuermann's Epiphysitis
    36. Osteochondrodystrophy
    37. Epiphyseal lysis
38. Bone Development
    Normal
    Delayed
39. Remarks
40. Prediction

LUMBOSACRAL ANGLE¶

Ferguson[60] prefers to speak of a "stable" rather than a "normal" lumbosacral angle. The variations within the stable range are too great to permit designation of any particular variation as the normal and the average lumbosacral junction is unstable.

The lumbosacral angle may be mechanically unsound in one or both of two ways:

1. The center of gravity of the trunk, as represented by a vertical line through the center of the third lumbar body, may pass anterior to the sacrum, sometimes as much as 2 inches. In so far as this line is anterior to the sacrum, a certain portion of the weight of the trunk is not sustained by bone but by muscles and ligaments which are, therefore, liable to strain. When the vertical line through the center of the body of the third lumbar vertebra passes more than ½ inch anterior to the sacrum there is some instability; when the distance is more than 1 inch instability is severe.

2. If the plane of the superior surface of the first sacral vertebra is too far from the horizontal, sheering stresses are set up which again make the muscles and ligaments liable to strain. When this surface is 42 degrees from the horizontal axis of the patient these stresses are of some moment; when the angle is 47 degrees they are a menace; when the angle is 52 degrees or more the stresses are severe and there is great instability. The greater the angle, the more "acute" it is said to be.[60]

Figure 7 illustrates the method used for measuring the lumbosacral angle and Figure 8 illustrates measurement of degree of lumbar lordosis.

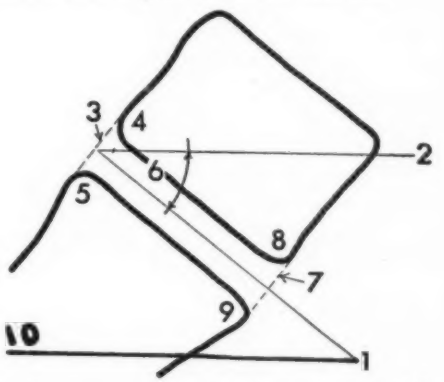

Fig. 7. Measurement of the lumbosacral angle (after Ferguson). Lateral exposure taken in the erect position.

1. Line through the middle of the disk between the fifth lumbar body and surface of the sacrum (superior line of the sacrum)
2. Horizontal line
6. Lumbosacral angle should normally be no more than 34 degrees

Measurement of the displacement of the fifth lumbar body. Lines 3 and 7 are parallel to each other

3. Line between 4 and 5 is normally perpendicular to 1
4. Posteroinferior edge of the fifth lumbar body
5. Posterosuperior edge of the sacral bone
7. Line between 8 and 9 is normally perpendicular to 1
8. Anteroinferior edge of the fifth lumbar body
9. Anterosuperior edge of the sacral bone
10. Parallel to 2. Sacral angle 1-3-2 equals 3-1-10

(Based on Fig. 414, p. 314, "Bone and Joint Radiology," by Emerik Markovits, M.D., copyright, 1949, by The Macmillan Company, by permission of the publisher.)

¶The term "lumbosacral angle" as used by Ferguson[60] is synonymous with the term "sacral angle" used in the reporting of the Progressive Structural Study of School Children.

TABLE II—STATISTICAL REVIEW OF THE SACRAL ANGLE

Year	Number of Cases	Degree of Sacral Angle									
		Below 20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61+
1947	100	5%	7%	8%	27%	32%	16%	4%	1%		
1947	768	2.1	6.4	15.3	25.9	23.3	15.6	7.3	2.99	.39	.26
1949	100	1.0	4.0	9.0	21.0	28.0	20.0	7.0	6.0	3.0	1.0

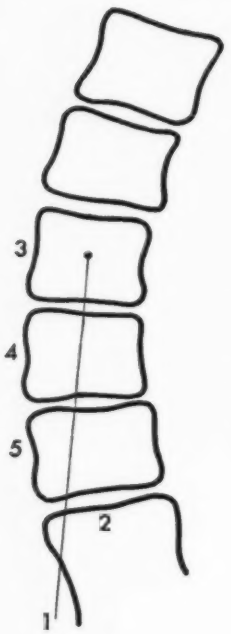

Fig. 8. Measurement of the degree of the lumbar lordosis (and of the displacement of the fifth lumbar vertebral body). Lateral exposure taken in the erect position.

1. Line drawn vertically from the center of the third lumbar body normally hits 2, or runs not more than ½ inch in front of it
2. Anterior surface of the sacrum
3. Third lumbar body
4. Fourth lumbar body
5. Fifth lumbar body

(Reproduced by permission of the publisher from Fig. 417, p. 315, "Bone and Joint Radiology," by Emerik Markovits, M.D. Copyright, 1949, by The Macmillan Company.)

HEIGHT OF FEMORAL HEADS

Figures 9, 10, and 11 illustrate the method of determining the height of the femoral heads.

Tables III and IV summarize findings of differences in height of femurs.

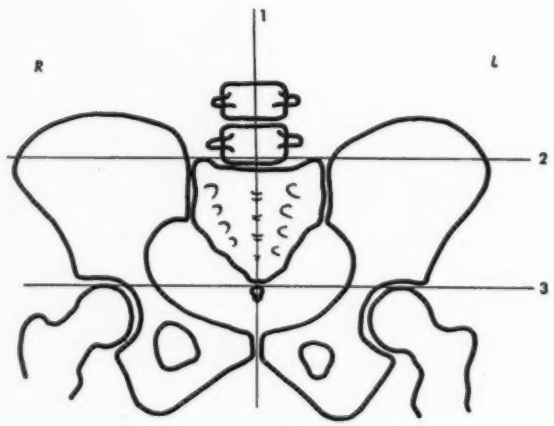

Fig. 9.

1. The line connecting the top of both femoral heads is horizontal. It is perpendicular to the long axis (1) and parallel to the line drawn at the sacral base (2).
2. The line of the sacral base is normally horizontal on exposure taken in the erect position.
3. Line 1 is coincident with the mid-film line and the mid-malleolar line where perfect symmetry exists in the erect position (Pearson).

(Based on Fig. 494, p. 355, "Bone and Joint Radiology," by Emerik Markovits, M.D., copyright, 1949, by the Macmillan Company, by permission of the publisher.)

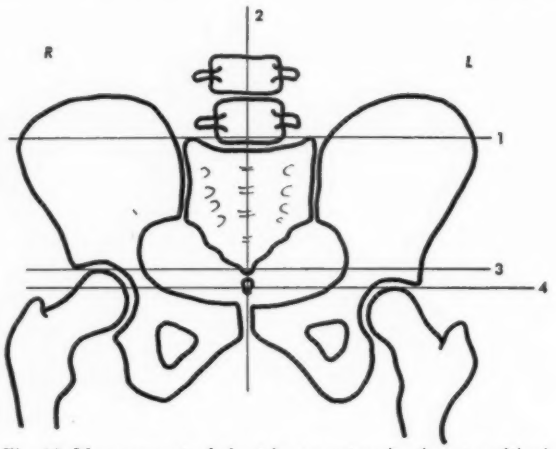

Fig. 10. Measurement of short lower extremity (erect position).

1. Line of the sacral base
2. Long axis of the body
   Mid-film mid-malleolar line
   Perpendicular to base plane of feet in erect position
   Plumb line coincident with mid-malleolar point
3. Horizontal line at the right femoral top
4. Horizontal line at the left femoral top

(Based on Fig. 495, p. 356, "Bone and Joint Radiology," by Emerik Markovits, M.D., copyright, 1949, by The Macmillan Company, by permission of the publisher.)

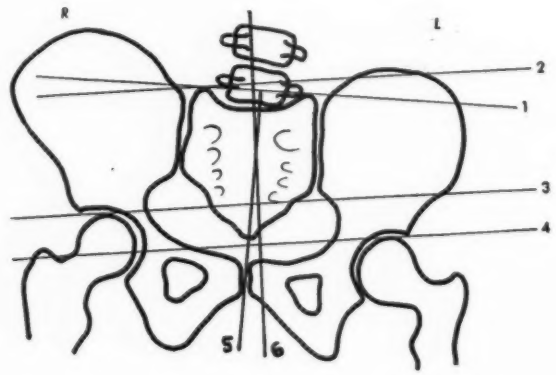

Fig. 11. Changed relationship between the line of the base of the sacrum and of the horizontal lines drawn at the head of both femurs in erect position.

1. The line of the base of the sacrum inclines to the left. The angle of inclination may be measured by drawing a horizontal line at the sacral base (2)
3. The horizontal line drawn at the top of the right femoral head
4. Horizontal line drawn at the top of the left femoral head. The distance between lines 3 and 4 indicates the degree of shortening of the left lower extremity
5. A perpendicular line at the mid-sacral point on sacral base line 1. When this line bisects the symphysis, and the gluteal air line, the pelvis has tilted as a unit. Alterations from symmetry indicate compensatory pelvic torsions (Pearson)
6. Mid-film line, also mid-malleolar line (Pearson)

(Based on Fig. 496, p. 357, "Bone and Joint Radiology," by Emerik Markovits, M.D., copyright, 1949, by The Macmillan Company, by permission of the publisher.)

TABLE III—OVER-ALL SUMMARY OF FEMUR HEAD LOWNESS

1947	391 Males				345 Females			
	Right	Left	Total		Right	Left	Total[1]	
Short less than $\frac{3}{16}$ in.	17.4	20.9	38.3%		19.12	21.43	40.55%	
Short $\frac{3}{16}$ in. or more	17.4	24.0	41.4%		17.68	24.06	41.74%	
Total visualized shortness				79.7%				82.29%
Equal leg length				19.2%				17.6%

1949	360 Males				350 Females			
	Right	Left	Total		Right	Left	Total	
Short less than $\frac{3}{16}$ in.	18.3	25.2	43.5%		18.2	20.2	38.4%	
Short $\frac{3}{16}$ in. or more	16.1	20.4	36.5%		18.3	19.9	38.2%	
Total visualized shortness				80.0%				76.6%
Equal leg length				20.0%				23.4%

TABLE IV—FEMUR HEAD LOWNESS IN INCHES

1947 Series

		0	$\frac{1}{8}$	$\frac{2}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{3}{8}$	$\frac{4}{16}$	$\frac{1}{2}$	Total Low Femur Heads		Equal Leg Length
Males (391)	Right	45	23	28	19	5	11	0	7	138	315	76
	Left	43	39	38	23	3	17	3	11	177		
Females (345)	Right	43	23	24	23	1	11	0	2	127	284	61
	Left	32	42	30	32	2	7	0	12	157		

1949 Series

		0	$\frac{1}{8}$	$\frac{2}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{3}{8}$	$\frac{4}{16}$	$\frac{1}{2}$	Total Low Femur Heads		Equal Leg Length
Males (360)	Right	23	43	13	24	6	11	2	2	124	288	72
	Left	32	59	32	20	5	10	0	6	164		
Females (350)	Right	18	46	24	20	5	10	1	4	128	268	82
	Left	23	48	24	25	6	8	1	5	140		

SACRAL TYPES

Sacral types have been classified as follows: Type I includes cases in which there is a sacral tilt to the short leg side; Type II, no sacral tilt; Type III, sacral tilt away from the short leg side; and Type IV, unequal leg length and unlevel sacrum. All four types have been expanded into subtypes A, B, and C and Type IV further expanded into subtypes D and E and a schematic code (illustrated in Figure 12) arranged for their designation. The code is based on the method of Pitkin and Pheasant used for measuring sacrarthrogenetic scoliosis.[61]

During the review of the 724 cases in the 1947 series the type pattern was formulated. Tables V, VI, VII, and VIII show the results of classification into types and subtypes and comparisons between the 1947 and 1949 series.

TABLE V—PERCENTAGE OF CASES EXHIBITING DIFFERENT SACRAL TYPES

Year	Number of Cases	Type I	Type II	Type III	Type IV
1947	724	67.5	14.6	7.0	10.7
1947	100	74.0	12.0	4.0	10.0
1949	100	64.0	22.0	5.0	9.0

TABLE VI—PERCENTAGE OF CASES EXHIBITING SACRAL SUBTYPES

	Number	Type I			Type II			Type III			Type IV			
Year	of Cases	A	B	C	A	B	C	A	B	C	A	B	C	D
1947	395	47.7	8.1	7.1	8.6	5.8	5.3	1.5	0.8	6.0	3.8	0.8	0.8	3.4
1947	100	67.0	4.0	3.0	10.0	1.0	1.0	2.0		2.0	4.0		2.0	4.0
1949	100	43.0	8.0	13.0	6.0	8.0	8.0	1.0	1.0	3.0	6.0		3.0	

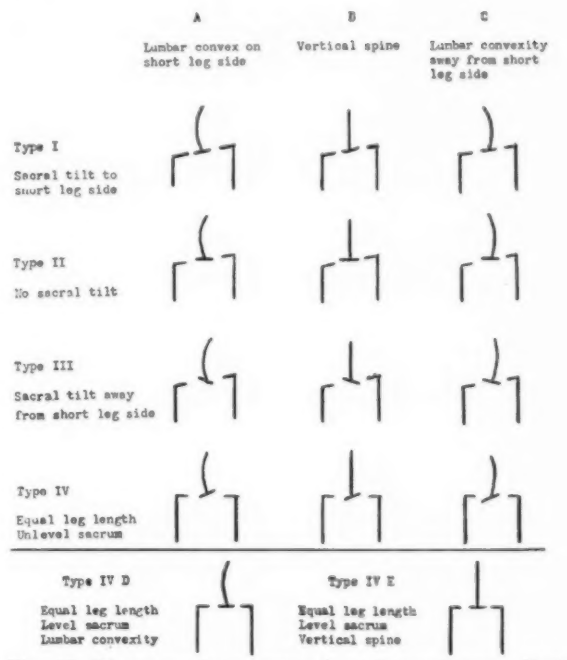

Fig. 12. Diagrammatic representation of sacral types. Each type also includes a mirror image of the figure shown.

TABLE VII—1949 FINDINGS ON 97 CASES FOUND TO BE TYPE I A IN 1947

Type I			Type II			Type III			Type IV				
A	B	C	A	B	C	A	B	C	A	B	C	D	E
55	6	10	1	7	1	0	2	1	4	0	3	5	2

TABLE VIII—COMPARATIVE FINDINGS IN 1947 AND 1949 ON 203 CASES

Year	Type I			Type II			Type III			Type IV				
	A	B	C	A	B	C	A	B	C	A	B	C	D	E
1947	97	21	16	19	6	7	1	2	6	9	2	2	15	0
1949	98	12	23	4	15	5	2	2	2	12	0	7	14	7

In making comparisons on 203 children, femur head lowness was studied in relation to sacral type. In children where there was a difference of femur head levels of ⅛ inch or less, 44.3 per cent remained the same sacral type and 26.5 remained the same type and subtype in 1949 as in 1947; with a difference of $\frac{3}{16}$ inch or more 66.6 per cent remained the same type and 39.3 the same type and subtype; with a difference of ¼ inch or more 45 per cent remained the same type.

In a study of films of 406 cases showing unlevel femur heads, sacral types and subtypes were found to occur in the following order: I A (192 cases), I C (39), I B (33), II A (23), II B (21), IV A (21), IV C (16), IV D (15), II C (12), IV B (9), III C (8), IV E (7), III B (4), and III A (3).

SIDE SHIFT

The amount of side shift is determined by measuring the distance (right or left) of the mid-sacral line from the mid-film mid-malleolar line. In the 1947 series the element of side shift was observed, but not recorded. In the course of rechecks on films

of poor quality and special problem cases it was observed that the side shift was characteristic of the individual and consistently recurred in films. Side shift of the pelvis occurred consistently in cases of unlevel femur heads and level femur heads. This observation suggested that side shift should be recorded and become a factor for correlation. The legs, base plane of the feet, and points of support at the femur heads do not form a parallelogram. In an adult the upper dimension is about 10 inches, the lower about 4 inches, and the sides (legs) about 36 inches. If a true parallelogram existed the pelvis would remain level regardless of side shift. The natural questions were should there be a leg-length correction for side shift and is the tendency for shift away or toward the low femur head? Does the side shift become a compensatory factor in pelvic leveling or is it a postural muscle factor?

A geometric unit was constructed. In this mechanical unit a side shift of 2 inches caused to appear an inequality of leg length, as measured from the floor upon which the feet rest, of $\frac{5}{16}$ inch. The femur head on the side of the direction of side shift lowers $\frac{3}{16}$ inch, while the one on the opposite side raises ⅛ inch, accounting for the difference of $\frac{5}{16}$ inch.

In the actual projected film a side shift of 2 inches caused to appear a difference of ¼ inch in the levelness of femur heads in an individual with legs of equal length. A shift of 2 inches exceeds practicability and becomes a forced situation in the average adult.

In the 1949 series side shift was recorded and coded as shift to high side and shift to low side. In a review of 588 cases the following was found:

TABLE IX—SIDE SHIFT IN RELATION TO HEIGHT OF FEMORAL HEAD

Amount of Side Shift	½ in. or less	$\frac{5}{8}$ to 1 in.	$1\frac{1}{8}$ to 1½ in.
Lowness of ⅛ in. or less with shift to same side	45	24	10
Lowness of ⅛ in. or less with shift to opposite side	36	23	3
Lowness of more than ⅛ in. with shift to same side	45	24	12
Lowness of more than ⅛ in. with shift to opposite side	35	22	4
Equal leg length	45	27	12

Of the 588 cases reviewed 367 showed side shift and 221 did not. Of the 367, 160 (43.5 per cent) showed shift to the side of the femur head lowness, 123 (33.5 per cent) showed shift to the opposite side, and 84 (23 per cent) had legs of equal length. Of the 221 without side shift, 83 (37.5 per cent) had leg shortness of ⅛ inch or less, 74 (33.5 per cent) had leg shortness of more than ⅛ inch, and 69 (29 per cent) had legs of equal length.

Apparently the side shift is not a compensatory method of physiological pelvic leveling, and to only a limited extent is it the result of the downhill gravity pull due to the low sacrum and low femur head.

The problem needs further study and correlation; however, at this time (1950) apparently a correction factor for side shift will not alter classification of type or consistency of low femur head. Side shift has become an element for record and statistical analysis in the 8-year interval of progressive structural study; a shift of ¾ to 1½ inches may alter the height of the femur head and may warrant a correction factor.

STATISTICS AND GENERAL STATEMENT ON 1947 SURVEY

Gross Statistical Survey.—The following tables summarize findings:

Sacral Angle Measured in Weight-Bearing Position:

Degree	Number	Per Cent
Below 10	1	
Below 20	16	2.1
20-25	49	6.4
26-30	118	15.3
31-35	199	25.9
36-40	179	23.3
41-45	122	15.6
46-50	57	7.3
51-55	22	2.99
56-60	3	.39
Above 60	2	.26
Total	768	

Sacral Type (Basic):

Type	Number	Per Cent
I	489	67.5
II	106	14.6
III	51	7.0
IV	78	10.7
Total	724	

Sacral Type Expanded (Subtypes):

Type	Number		Per Cent	
I A	189		47.8	
II A	34		8.6	
III A	6		1.5	
IV A	15		3.8	
		244		61.7
I B	32		8.1	
II B	23		5.8	
III B	3		0.8	
IV B	3		0.8	
		61		15.5
I C	28		7.1	
II C	21		5.3	
III C	24		6.0	
IV C	3		0.8	
		76		19.2
IV D		14		3.4
Total		395		

TABLE X—OVER-ALL SUMMARY OF SACRAL ANGLE* 1947 SERIES—753 CASES

Age	Number of Cases			Degree	
	TOTAL	M.	F.	M.	F.
5	39	18	21	31.6	32.6
6	86	49	37	33.6	34.5
7	96	53	43	35.7	35.6
8	79	37	42	36.8	34.7
9	87	37	50	33.9	34.5
10	88	47	41	34.6	36.9
11	85	40	45	35.0	37.8
12	86	42	44	39.9	37.7
13	82	46	36	38.8	36.6
14	14	13	1	39.4	
15	9	6	3		
16	1		1		
17	1	1			

*Sacral angle degree omitted where sample was too small to be representative.

Positive Chest Findings:	
Heart	29
Respiratory	27
Patch Test	54
Full Tuberculosis Check	34
Recheck	9
	153
Positive Urine Finding:	6
Sacral Angles	
40 degrees or less	562
41 degrees or more	206
Lordosis	225
Flat Lumbar	106
Film Silhouette Abnormal	59
Disk Space Abnormal	58
Spondylolisthesis	9
Persistent Nutrient Vessels	118
Requested Recheck	189

General Statements.—The following statements were formulated:

1. No opinion can be expressed at this time.

2. The predominance of sacral angle between 26 and 45 degrees necessitates a further breakdown.

3. The incidence of positive chest findings is within normal.

4. The predominance of type IA sacrum and basic type I attracts attention.

5. Occurrence of femur head lowness of an effective degree ($\frac{3}{16}$ inch or more) on the left in 188 cases and on the right in 131 indicates the lack of influence in the child of fixing eye and right handedness.

6. Half of the children have an anomaly of some kind that may alter their postural pattern.

7. The predominance of left lumbar scoliosis (408) over right scoliosis (252) presents a problem for further analysis, especially with the lack of a direct relationship to low femur head.

8. The request of rechecks (189) indicates the need for the perfection of the technic in management of children for standing studies.

9. The screening and over-all survey provides a basis for improved records and technic in succeeding years of this project.

COMPARATIVE STUDY OF 1947 AND 1949 RADIOGRAPHS

As stated previously 100 films from the 1947 series were selected by taking numbers divisible by five. Corresponding radiographs were taken from the 1949 series and the following observations were made:

1. Seventy-seven of the 100 cases under comparative study revealed that the low femur head appeared on the same side in both studies.

2. Twenty-three of the 100 cases under comparative study revealed variation in the femur head lowness. This variation exceeded ⅛ inch in 4 of the 23 cases.

3. There was no variation of low femur head from side to side in any case that had a lowness of ¼ inch or more.

4. Of the 77 cases that revealed a low femur head on the same side in both series, 5 demonstrated a variation of ¼ inch or more.

5. Sixty-two of the 100 cases under comparative study presented the same sacral tilt in relation to the low femur head.

These five points indicate that a technic has been developed for the radiographic examination of children between the ages of 5 and 12 that gives consistency in findings.

While no change from side to side was noted with femur head lowness of ¼ inch or more, it was found that lowness of ⅛ inch or less shows consistency in 77 per cent of cases, a valuable piece of statistical information.

Knowing that the review of the 100 comparative cases with the reports enclosed has taken 100 man hours of three technically trained people, it is evident that reviewing and recording the 900 1949 cases will prove a difficult and prolonged undertaking. Specific studies of material can be made at intervals only. Gradually devices develop that aid materially in reviewing records. The breakdown into age groups has been completed.

Review of material has been made that will show relationship of the unlevel femur heads, the tendency of the sacrum to level or to follow the low femur head, and the potential factors that contribute to the problems observed in adults by osteopathic physicians.[62]

The only conclusion at the present time is that a comparative study of research quality can be made of school children in grades one through eight. When the records of four 2-year intervals are at hand, a pattern may emerge that will contribute to the basic information needed to understand how to proceed in the prevention of symptom-producing faulty mechanics in both the child and the adult.

PROJECT PROBLEMS

Unanticipated Problems.—

1. Getting from 831 to 915 school children in and out for physical and structural examination (This undertaking has required the full-time services of three teachers, three parents, three bus drivers, one secretary, and one x-ray technician for 2 days each week from September through January.)

2. Setting up a recording system whereby correlation can be accomplished with the minimum of effort

3. Correlation of the public health and welfare record with the structural findings.

Problems growing out of the Project.—

1. A report for publication as soon as the 1949-50 structural studies have been recorded

2. A current correlation between the 1947-48 series and 100 units of the 1949-50 series, to establish the consistency of the factual findings

3. The development of a recording system that promotes rapid correlation

4. The comparison of the first film series with the second film series and a recording of the change in the gross mechanical picture

5. The setting up of a prediction card on each 2-year study unit

6. The selection of 100 cases for experimental management through home procedures

7. The selection of a few cases for the study of the influence of corrective manipulative treatment

8. The selection of 100 cases for complete lesion analysis

9. The selection of consultants outside the osteopathic profession. (The service of an individual experienced in anthropology, one in physical education, one in industrial medicine, and one in the insurance field are needed. Such consultants should review the project from their viewpoint and indicate the phases that should be developed for public service and philanthropic support.)

PROBLEMS FOR SPECIAL PRESENTATION

1. Anomalies—incidence[63]
2. Incidence of low femur head
   a. Over-all
   b. 1947 series
   c. 1949 series
   d. Comparison of 1947 and 1949 series
3. Sacral Angle
   a. Average, age, sex, 1947 series
   b. Average, age, sex, 1949 series
   c. Comparison of 1947 and 1949 series
4. Sacral Type
   a. 1947 by age, sex, average, median
   b. 1949 by age, sex, average, median
   c. Comparison of 1947 and 1949 series.

CURRENT STATISTICAL MATERIAL
(November 11, 1950)

1. Record of preliminary survey 1944-47
2. Record of check film technic 1944-47
3. Record of individual reading variation 1944-47
4. Record of 722 structural studies 1947 series
5. Record of new students and rechecks 1948
6. Record of 753 structural studies 1949
7. Start on 1950 new students and rechecks
8. A comparative study of 100 sets of films from 1947 and 1949—technic check
9. Record of comparative statistics, 414 cases, 1947 and 1949
10. Record of comparative study of sacral type, 1947 and 1949
11. Analysis of type change in 2-year period
12. Record of sacral angle 1947—age, sex, degree, median, average
13. Record of sacral angle 1947—age, sex, degree, median, average
14. Record of sacral angle incidence, 1947 series —age, sex
15. Record of sacral angle incidence, 1949 series —age, sex
16. Record of sacral angle in 5-degree groups, 1947, 856 sets
17. Record of femur head lowness, 1947 series, age, sex
18. Record of femur head lowness, 1949 series, age, sex
19. Comparative study of femur head lowness, 1947 and 1949 series, 414 cases
20. Record of anomalies, deformities, and bone disease, 1949 series.

ULTIMATE GOAL

1. The statistical review of four sets of structural films taken at 2-year intervals
2. The experienced review of four sets of structural films taken at 2-year intervals
3. A determination of the tendency for inherent structural errors to increase or diminish
4. The selection of cases for the application of structural therapy
5. Presentation of material to children's foundations for review and support.

SUMMARY

1. The purpose of the structural study of rural school children in Adair County, Missouri, is to present for experienced and statistical review four sets of structural standing weight-bearing x-ray studies taken at 2-year intervals, from which conclusions can be formulated. These records and conclusions are expected to enlarge the material related to the subject of body mechanics in health and disease, to place in the research record the school child's natural structural tendency, and to provide a practical, authentic approach to the structural aspects of preventive medicine.

2. A review of literature indicates that this study will fill a gap because the method of study is new. The progressive 8-year approach is employed to determine normal trends.

3. Experience indicates that the method of management and the technics employed in this project show sufficient consistency to warrant their further utilization.

4. Femur head lowness, commonly termed "leg shortness," is visualized in 80 per cent of rural school children between the ages of 5 and 13. Small amounts of shortness (less than 3/16 inch) are found in 20 per cent of children and appear to be a consistent factor.

5. Sacral types appear consistently from year to year. Type IA occurs most frequently and most consistently. This type is characterized by low femur head, low sacrum, and lumbar convexity on the same side.

6. Side shift needs further examination and correlation. Side shift may be the cause, the effect, or a phase of the postural pattern. Large amounts of side shift can account for small amounts of femur head lowness.

7. The sacral angle appears to be slightly greater when measured by the method used for its determination in this project than when using the method of measuring the angle of a line between the symphysis pubis and the posterosuperior iliac spine.

8. The frequently reported 85 per cent incidence of anomaly and deformity in adult backs apparently applies to children to a degree only slightly less. Possibly even the slight discrepancy is due to the fact that the type of x-ray study used in this project does not produce detailed visualization.

9. In the group of rural school children studied, there has appeared no painful structural symptom sufficient to cause the parent or child to seek consultation with a physician. One case of Perthes' disease produced an error of locomotion that was noticeable but pain-free and one case of hemivertebrae existed without noticeable deformity.

10. Anatomical shortness of "femur head lowness" as visualized by standing structural x-ray studies represents a complex factor. Femur head lowness, or so-called leg shortness, is as prevalent in children aged 5 to 13 as in adults. Apparently femur head lowness and the associated problems rarely produce painful spinal symptoms in average, normal, healthy children.

11. *All* the structural problems of adults that are visualized by standing structural film studies are present in children between the ages of 5 and 13 with the exception of arthritis.

12. The concept that the structurally faulty adult was during childhood structurally normal appears to be unfounded.

13. Problems of structural nature, serious but not producing symptoms, revealed by this study strongly suggest the need for routine structural examination by use of x-ray films during the preschool years or during the first school year.

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Prenatal Management Including Osteopathic Manipulation*

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This paper is written for the general practitioner by a general practitioner who practices in a state with limited practice rights. With the scrutiny given osteopathic obstetrics in our locale it is essential that we do our best. For obstetrics to be the best it is essential that the prenatal care receive primary and paramount attention. I emphasize this stage of pregnancy because it represents the longest period—280 days compared to hours of labor or 6 weeks of postpartum care. Also if we do a good job of prenatal care the other stages to follow will be more normal.

In 1940 I prepared a paper on prenatal management to be delivered before a group of interns. After 11 years in general practice it is amazing to note the changed stress; many aspects which at that time were not emphasized now seem important to me. I know that 10 years from now I will have an entirely different viewpoint of what is important in prenatal care. Possibly many of you will not agree with some of the ideas that I call important. Nevertheless, I hope that 10 years from now your ideas will also be different. That will manifest progress paralleling improvements in other osteopathic fields.

I do not mean to minimize the importance of other phases of prenatal care; however, my intent is to confine my remarks to a few psychological suggestions and, as you can see from the title, to stress osteopathic manipulative treatment. Certainly standard procedures such as bowel management; exercise and rest; control of eating and drinking habits and the use of nutritional supplements; care of the teeth, breasts, and abdomen; clothing, et cetera should be followed and be well understood by the patient. All of these are important; in fact a paper could be presented on any one of these topics individually.

I have nothing new to offer in this paper. Most of the ideas are gleaned from such meetings as this and are not original. I intend simply to present the material as a review for you and perhaps these points will receive new emphasis in your practice.

When I speak of prenatal management, I refer to the management of the normal pregnancy. This care should begin as soon as possible after the first missed menstrual period. Because of the many changes in the maternal organism, the pregnant woman's margin of reserve is decreased so that she must be instructed to continue her good habits of living and to discontinue her poor habits. To help in this instruction a good history is, of course, essential. Many of you are the family physician in which case the history can be very limited, the patient's background being familiar to you.

Taking this complete history helps us to know our patient. This is important. The physician should know his patient so well that by the time she is ready to be delivered he can predict with a reasonable degree of accuracy how she will act when actually in labor. We also have a natural opportunity to become better acquainted with the patient during the few minutes of manipulative treatment given at each visit. With this acquaintance, full confidence is developed. In the past people used to speak of "the laying on of hands" in healing. That has its point and definitely applies to the contact made in treating patients prenatally.

The psychology of prenatal care can not be overemphasized. The complete physical examination given all patients has its value, of course, in determining their physical condition. It also serves an equally important function as a psychological sedative for it gives the patient confidence that she is physically capable of normal childbearing. If she can be assured that her pelvic measurements are adequate, that her heart is within normal limits, and that her muscles are pliable and elastic, she will enter labor in a much better condition mentally. For this psychological pickup, one of the things that I feel should be routine, especially with all primiparae, is a pelvimetry and cephalometry made not earlier than 4 or later than 2 weeks before term. The information on the roentgenogram is invaluable to the doctor and has educational and psychological values for the patient as well. All prospective primiparae should have the opportunity of viewing their prenatal films and of having the study explained to them so that they can understand it.

In this plan of prenatal education emphasis is placed on the importance of the mother's knowing the basic facts of pregnancy and labor. The effect of anxiety and tension on physiological functions should be explained. All questions that are in the patient's mind should be answered in layman's language. There is no such thing as a foolish question and they should be so assured. The patient is given literature and charts to study and is told what further reading is recommended. Six weeks or a month before term, labor should be discussed with the patient and the action of the voluntary and involuntary muscles and the stages of labor and signs of beginning labor explained. She is told what to do and when to do it when labor begins. Certain details of labor are explained such as the purpose of rectal and vaginal examination, artificial rupture of the membranes, episiotomy, the molding of the fetal head, the descent, and the propulsion of the fetus through the birth passage. Pathological labor is not discussed except in answer to specific questions. The prospective mother is assured that pain relief will be available at delivery time if she so desires. An attempt should be made to dispel any idea that may cause her worry at any time. Last month I heard of a patient who on her fourth postpartum day was actually worried to the point of having a temperature because she did not know why

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she still had a "lump in her stomach." Such a state of ignorance is inexcusable, yet variations of this ignorance exist in every busy hospital, especially if the physician has not taken time to educate his patient properly or to develop a common understanding so that she will feel free to ask questions.

For psychological reasons no patient in active labor should be left alone and she should be assured that she will not be. Early in labor the husband or some friend is instructed to stay with the patient. If she has full confidence in her doctor and in herself, there will be no fear in her psychological background of the oncoming labor contractions; thus labor pains are minimized and progress is more rapid. I also try to reserve one afternoon a week—sometimes difficult in general practice I know—for maternity and pediatric cases. It is surprising the amount of knowledge that is exchanged and the questions that arise from discussions in the reception room. Moreover, it is psychologically beneficial for prospective mothers to see healthy children coming in for regular check-ups. Their desire to soon duplicate this situation makes them even more cooperative and helps them to have the proper attitude toward the coming offspring.

The one thing that does not change in osteopathic care is the manipulative principle. This principle is a basic foundation from which variable technics may be developed. Osteopathic manipulation is of great value in minimizing the discomforts of pregnancy and in preparing the mother for the delivery by making labor easier.

Stinnett[1] in 1938 said that osteopathic manipulative treatment is always beneficial in pregnancy but is found to be especially beneficial in older patients. It may mean the difference between a difficult labor with injury and one which is normal with a minimal amount of damage to the internal tissues. The correction of lesions in the lower lumbar and sacroiliac areas not only relieves strain and symptoms in the joints themselves, but by remote effects normalizes the blood supply to the pelvic organs and gives the fetus a better chance to develop naturally.

If this treatment is good for the older primipara certainly the effects will be beneficial to all obstetrical cases. So we see that obstetrics offers one of the most fertile fields for manipulation to be found in the realm of healing.

Many doctors do not manipulate the lumbar and sacroiliac area in early pregnancy for fear of causing abortion. Actually, however, lumbar lesions may cause the abortion and early correction will aid in the stabilization of pregnancy and not endanger it. Osteopathic manipulative treatment achieves its beneficial effects primarily by physiologic modification of vasomotor tonus. You may call it osteopathic structural or postural therapy if you wish. Certainly the posture and structure of pregnancy needs attention. I consider those exercises recommended for postpartum care to be even more beneficial in prenatal care. Knee-chest or knee-shoulder position, which is begun routinely at the beginning of the second trimester, is recommended early in pregnancy for patients with nausea. Knee-chest position can relieve the tension on the round ligaments, especially after correction of any innominate lesions. It is advisable for the pregnant patient to assume this position for 10 or 15 minutes after manipulative treatment at each prenatal visit. Thus the circulation to the uterus and even to the intestines is increased by the change in posture.

We know that capillary circulation in the embryo is established by the fourth week of gestation, that in the third month centers of ossification appear, and that during the fourth month the uterus becomes an abdominal organ which increases in capacity approximately 500 times during pregnancy. Everything possible therefore should be done to normalize circulation to that organ. By restoring the structural relationships of the mother's pelvis and spine we find we have also improved the circulation to the soft tissues.

In order to achieve and maintain this normalization the prenatal patient should be seen and treated at least every 3 weeks during the first 7 months and once a week thereafter. Between visits the patient should be impressed with the importance of her part in the program. Instructions are given at each visit as to what exercises she should practice until the next visit. The exercises can be classified into two groups: those that are aimed at increasing the tone and efficiency of the back, abdominal, and perineal muscles, and those that promote physical relaxation. These latter find their greatest application during labor.

Now to explain a few of the exercises. For muscle relaxation and control the following exercise is recommended: The patient sits on the floor Indian style with the thighs apart, knees bent, and feet crossed medially in front of her. In this position she does breathing exercises and also exercises to train her to relax and contract certain groups of muscles. An example would be to have her alternately contract and relax the perineal or other pelvic muscles and alternately lower and raise the diaphragam first by bearing down (positive abdominal pressure), then by "sucking in" (negative abdominal pressure). The latter part of this exercise, of course, increases abdominal circulation tremendously. Another exercise is a squatting exercise. With the thighs as far apart as possible, the patient raises and lowers the trunk perpendicularly. When squatting, the patient should spring her thighs apart a few times before rising to repeat the exercise. In the next exercise the patient lies supine with feet flat on the floor and knees bent and rocks her pelvis from side to side as far as possible, keeping the shoulders flat on the floor and fingers locked behind the neck. I call the next exercise "rocking the sacrum." The patient lies supine with a rolled catalog or heavily padded rolling pin beneath the sacrum. She then brings the knees up to her abdomen. This motion forms a convexity of the lumbar area. As the legs are slowly straightened, a concavity of the lower lumbar area is formed. This exercise is quite strenuous so be sure to caution the patient against overexhaustion. The exercise should be performed only a few times at first, increasing the number as the mobility of the spine and sacrum improve.

Osteopathic manipulation is directed toward the normalization of two different types of osteopathic pathology: (1) those lesions which may be present in any individual, and (2) those lesions caused by the change in body balance as a result of pregnancy. These changes in balance are sufficient in themselves to decrease the mobility of the vertebral articulations and when such postural deviations are superimposed upon chronic lesions, regions of acute difficulty may result.

I would now like to discuss some of the specific technics used for prenatal patients at the office. All technics applicable to the nonpregnant female patient may be used if the enlarging abdomen causes no discomfort. It must be remembered, however, that less force is needed to correct lesions of a pregnant patient because during pregnancy the pelvic ligaments become more elastic.

In addition to the specific technics we all use, the following help make the pelvis a more pliable birth passage: With the patient in a supine position, bring the knees up as far as possible, heels together on the table. Now, ask the patient to hold her knees together as you apply a counter force to separate them. At first the patient's ability to oppose your force is very weak but soon she develops adequate muscle control. Many times you can feel or even hear a sudden release of the symphysis pubis when applying pressure. Next I reverse the starting position: the thighs are completely abducted, even to the point of springing them beyond what the patient feels is complete abduction. Instruct the patient to leave the heels in the original position. Now, have her resist your attempt to adduct the knees toward the midline against her resistance. Be sure the patient keeps the hips on the table. It is always wise to correct the lumbar and sacroiliac lesions before attempting this part of the treatment; otherwise these procedures may cause leg cramps. However, if these procedures are done following the manipulative treatment of normalizing the pelvis and spine, leg cramps or sore muscles do not result.

In a series of 24 primiparae deliveries, records of actual labor time were kept to determine if the suggestions in this paper were of any value. The average age in this series was 21 years, the ages varying from 16 to 38 years. Eighteen cases were home deliveries and six were hospital deliveries. No anethesia or analgesia was used until the second stage of labor and then only upon the patient's request. The labor time in this series ranged from 24 minutes to 22 hours, the average being 8 hours and 2 minutes.

I hope that you have gained something of value from these commonsense suggestions which I have labeled psychological care. I hope that as a result of this paper you will better acquaint yourself with your patient and that you will see that she gets the proper prenatal education. The result will be a patient having full confidence in herself and in her doctor. This situation, combined with a healthy, satisfied mother, will make your obstetrical experiences more gratifying.

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Practical Observations on 150 Cases of Obesity

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The purpose of this paper is to review the results in a series of 150 cases of obesity treated with some form of amphetamine and a low calorie diet and to comment on some of the more practical aspects of the treatment.

Obesity may be defined as any weight which is 20 per cent above normal. Under this definition, obesity must be said to exist in one out of every five adults. There are two types of obesity: the exogenous type caused by overeating and the endogenous type due to nervous, endocrine, or sodium-water metabolism disorders. It has been my experience that most cases are a combination of the two. Observations in this series of cases make me feel that psychosomatic stress and heredity are the most common causes of obesity and that wrong eating habits, learned early in life, also play an important part. The old idea that weight is health is no longer acceptable and the patient should be educated to its fallacy. Mothers and fathers should stop stuffing their children and feeling that they are well only when they are overeating. Such incorrect eating habits established early in life will be difficult to break in adulthood.

What are the reasons for controlling obesity? I find that most people are interested in reducing principally because of their appearance. While this is a legitimate reason for treatment, more important reasons are found in insurance company statistics such as the following: People 15 per cent overweight show 22 per cent more deaths from all causes. People 24 per cent overweight show 44 per cent more deaths than would normally occur. People who are more than 25 per cent over normal weight show 75 per cent more deaths. The mortality rate in cardiovascular disease alone is two and one-half times greater in overweight persons than in normal weight persons and cardiovascular disease is one of the most frequent causes of death.

In this study there were 107 adult females who averaged 37.84 pounds above their normal weight. Their average loss at the end of 4 weeks was 9.36 pounds. At the end of 8 weeks the average weight loss was 13.51 pounds. At the end of 12 weeks they had lost an average of 19.02 pounds. Ten per cent of these patients had mild reactions to medication and 15 per cent of them required the use of ammonium chloride.

Fourteen female patients in the series were under the age of 21. They averaged 49.55 pounds over normal weight. At the end of 4 weeks of treatment they lost an average of 9.25 pounds; at the end of 8 weeks they had lost an average of 15.25 pounds; and at the end of 12 weeks they had lost an average of 20.15 pounds. The percentage of complete failures was highest in this group. There were no reactions to the medicines used. Only 7 per cent of these cases required ammonium chloride. The recurrence rate after treatment in this adolescent group was so high that I now feel that it is best to delay treatment until after the age of 21.

Six men under the age of 21 were also included in this study. They averaged 30.08 pounds overweight. They lost an average of 7.66 pounds in 6 weeks. In 8 weeks they had lost an average of 16 pounds. However, at the end of 12 weeks they had lost only an average of 17 pounds. There were no reactions to medication in this group. In 16 per cent of these cases ammonium chloride was required. Twenty-three of the men in the study were over the age of 21. They averaged 44.50 pounds overweight. At the end of 4 weeks they had lost an average of 11.13 pounds and at the end of 12 weeks they had lost an average of 23.99 pounds. Reactions to amphetamine were seen in 4 per cent of the patients and 4 per cent required ammonium chloride.

The average number of pounds overweight of all the men in this study was 41.25. The average weight lost during 3 months was 20.5 pounds. Women of all ages in this study averaged 43.69 pounds overweight at the beginning of treatment and lost an average of 19.67 pounds in 3 months. The over-all average of pounds overweight at the beginning of treatment was 42.47. The over-all weight loss during 3 months was 20.58 pounds. In this study 7 per cent of the patients had reactions to amphetamine and 10 per cent required ammonium chloride.

It is my impression that nervousness and social and financial insecurity constitute the most frequent causes for obesity. Therefore, to help overcome the stress that leads to overeating the treatment must include some psychotherapy for each patient at each visit. Frequently, it is sufficient just to listen to the patient's complaints; often, however, sensible and friendly advice should be given on physical and mental hygiene. Moreover, on the basis of my experience with this study I feel that it is almost useless to attempt to treat patients under the age of 20 or over the age of 60. Apparently the nervous system in these age groups is usually not stabilized sufficiently to carry out the necessary program.

Every examination should include a careful medical history and also a comprehensive family history which often will shed light on the patient's problem. A complete general physical examination should be made with special attention to the thyroid gland and nervous system. Also, a urinalysis should be done routinely and a basal metabolic test performed on every patient whose blood pressure is subnormal, whose pulse is slow, or whose reflexes are sluggish. The patient's height, actual weight, and normal weight should be prominently marked on the top of the chart. A brief discussion should then be held with the patient to agree upon the weight to be reached. I usually feel that a patient should reduce to a weight which is not more than 10 per cent above his ideal weight. The length and extent of treatment is based upon the following calculation: The agreed number of pounds to be lost, divided by 2, equals the approximate number of weeks of treatment. For example, if the patient's normal weight is 150 pounds and he weighs 190 pounds, I suggest that he reduce to 165 pounds, a weight loss of 25 pounds. By using the above formula it is soon apparent that about 12 weeks will be required to reach the desired weight, providing the patient is able to cooperate.

It is my experience that the patient will lose exactly the same amount of weight in any given interval between visits; therefore, in order to complete the treatment in a reasonable period of time, the patient should be seen at weekly intervals. Again and again I have observed that the patient with an appointment in 2 or 3 weeks will lose no more weight than he would lose if he were to return at the end of 1 week. This must be due to the psychosomatic aspects of the treatment since the medication and the diet are not varied. If the patient knows he does not have to come back for 2 or 3 weeks, he is likely to be lax in his routine, hoping to lose the required weight in the last few days before he is examined again. This is a poor approach, however, because it allows the patient to vacillate between strict control and no control; whereas, if good habits are to be formed, the control must be continuous.

I also point out to patients that economically nothing is saved by longer intervals between visits. I illustrate this as follows: Patients lose about 2 pounds between visits. If a patient has 30 pounds to be lost it will require 15 visits and it may be done in 15 weeks. If the patient comes every 2 weeks it will require not 15 but 30 weeks and, in the end, the patient will make the same 15 visits but will have wasted 15 weeks of time. It is interesting to note that frequently the patients sense this factor themselves and insist on coming at weekly intervals even though I may suggest they increase the period between visits because they seem to be doing so well.

In treating obesity cases one must beware of "carrying the patient." Nothing is to be gained by prescribing medication for a patient who is not losing weight but who merely takes the medicine so that he may eat abnormally. I frequently explain to patients that, in general, a person should eat about 2,500 calories a day. Obesity occurs as a result of eating about one-half again this much or about 3,700 calories. To reduce, one must eat only half as many calories as are normally required per day or about 1,250. I also point out to my patients that after they have lost the weight (because they have been eating half as much as they normally need), they will be able to double their daily caloric intake and not gain any weight.

The medical program which I follow in obesity cases consists principally of administering some form of amphetamine in doses of from 3 to 15 milligrams before each meal. This decreases the patient's appetite and gives him chemical stimulation so that he will not so easily feel the lack of food. Since amphetamine is constipating, I include a simple laxative in the morning dose; since there is also some tendency to insomnia from amphetamine I include a light sedative in the evening dose. Thyroid extract is included if its need is indicated by the basal metabolism. Sometimes it is also used in patients with normal basal metabolism but who demonstrate low blood pressure, sluggish reflexes, and a slow pulse. I have found the proper dose of thyroid to be extremely variable. Some patients are unable to tolerate 0.1 grain while others tolerate as much as 9 grains per day with nothing but beneficial effects. The average is about 2 grains per day. However, I have found that the dose of thyroid must be arrived at by clinical trial with each patient.

I have used a variety of diets over the years. When I received complaints or suggestions on a diet, I took notes and the next time the diets were printed made the necessary revisions. As a result, a diet has evolved which seems to be the most practical for the average

person; at least, I now hear few complaints or suggestions about it. The food in the diet is available at practically any time by any person at home or at work and it consists of the following:

BREAKFAST

1 egg
1 orange
1 slice of bread
½ pat of butter
1 cup of coffee (1 teaspoon of sugar)

LUNCH

1 meat or cheese sandwich
1 large glass of whole milk
1 apple or 1 orange

DINNER

1 slice of lean meat or fish
½ white potato
1 sauce dish of cabbage, onion, broccoli, cauliflower, string beans, tomato, or carrot
½ head of lettuce with vinegar or mineral oil dressing
1 slice of bread with ½ pat of butter
1 peach, pear, or apple
1 cup of tea (1 teaspoon of sugar)

BEDTIME

2 graham crackers and ½ glass of milk

This diet averages about 1,250 calories and while it may seem high for reducing purposes it has proved to be the best for practical use. Restricting the patient further often results in the patient's losing control of the diet. The most frequent comment I hear regarding the diet is, "I don't eat that much now. Why I never eat breakfast except for coffee and fruit juice." A little gentle questioning will usually demonstrate the patient's lapse of memory, however. Other things eaten between meals, double portions, and drinks, soft or hard, are usually forgotten. It is at this point that the physician should avoid scolding. Arguing with a patient will only make him feel ashamed and consequently uncooperative. A sensible, friendly agreement is much more effective and workable. I take as much time as is necessary to try to induce the patient to eat the breakfast as printed on the diet. I explain that the medication and the diet are balanced properly and that if the patient takes the medication without the proper amount of food, reactions may result which will upset the whole plan.

There are two other phases of the medical therapy which should be mentioned. If the patient shows any pitting following the application of pressure over the lower part of the tibia, I suggest that he not add salt to the food at the table. If signs of edema continue in spite of this restriction, I then ask the patient to take a gram of ammonium chloride after each meal until proper sodium-water balance has been achieved. If the patient is in the climacteric an injection of 1 milligram of natural estrogenic substance is given to the female patient and 10 milligrams of testosterone are given to the male patient. Some patients are given 100 international units of chorionic gonadotropin for its mild endocrine stimulating effect. This latter proves especially effective in larger doses if there is any suggestion of Fröhlich's syndrome. Headaches and insomnia may be overcome by reducing the dose of amphetamine or by changing to another form of the same drug. I have found the dextrorotatory isomer of amphetamine sulfate to be the most effective and best tolerated form. Furthermore, I no longer hesitate to introduce the medical and dietary program to patients with hypertension because I have found that there is an immediate reduction in the blood pressure commensurate with the weight loss. While it is possible that the medicine in some cases might be expected to raise the pressure, it is my observation that before this can happen the pressure is reduced by the weight loss.

Newburgh[1] calculates that a patient must walk 36 miles to get rid of 1 pound of fat tissue. I have not observed any effect from exercise, massage, or heat on local fat deposits.

Obesity has a profound effect on shortening the life span and increasing degenerative diseases and I am sure that if doctors could make the obese patient understand the returns in long life and good health derived from weight control, the patient would admit that normal weight is one of the best bargains in health to be found. The patient must treat his obesity problem as seriously and with as much concern as any other type of illness if he expects to be successful. Likewise the physician must take the problem seriously. He cannot hand the patient a diet together with a box of pills and tell him to come back in a month if he expects to help these patients. Not only must the doctor have a real understanding of the problem but he must have a friendly yet scientific attitude in dealing with the patient.

SUMMARY

A review of the treatment in 150 obesity cases is made and several observations of a practical nature are noted.

217 Milbank Ave.

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THE LOW-SODIUM DIET

In referring to the low-sodium diet the term "salt-free" is often used. There is no such thing as a "salt-free" or "sodium-free" diet. There is some sodium in practically everything that we eat inasmuch as sodium is a very common ingredient of the soil in which plants grow, and is always present to some extent in the plant and animal products which are used as food. Persons on a low-sodium formula are told not to use table salt from the shaker and so the term "salt-free" has come into use. When the emphasis is wrongly placed upon table salt, there is a strong tendency to forget other sources of sodium than those found in the shaker.—Thurman B. Rice, M.D., "Low-Sodium Diet," Lea & Febiger, Philadelphia, 1951.

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REST AND PAIN[1]

Much of man's handiwork is doomed to age quickly—to this fact the medical textbook is no exception. Unless revised every few years its life span will not exceed that of its authors. It is a fortunate textbook, with its revisions, if it has not fallen into oblivion before 25 years. When a publisher brings out a new edition of a book 90 years after it first appeared the event commands attention.

In 1828 Guy's Hospital was more than a century old and was then one of the great hospitals of London. Its medical school in connection with the hospital had just appointed a new demonstrator in anatomy, a stocky, rugged young man by the name of John Hilton, who had already developed a reputation at the age of 23 for meticulous dissections to the point that he was called "Anatomical John." In those days anatomy and physiology were taught concurrently so that anatomy became much more than a list of names memorized from a printed page. The student thereby became keenly aware of the relationship of structures; structure and function were not thought of as in separate compartments. Minds were not merely memory storage files but were used to reason with.

Hilton became quickly known for his remarkable powers of observation and his ability to discern important facts from the least obvious indications. Promotion was rapid, first as a Fellow of the Royal College of Surgeons, then assistant surgeon to Guy's, and lecturer in anatomy in 1845. "It was not enough to investigate the minute anatomy of parts, but his interest was such that his inquiring mind ranged over the purpose of their disposition, and in this way he came to examine the nerve-supply to joints, to the muscles activating these joints and to the skin lying over them. He realized that there must be some purposive relation in the fact that all these structures were supplied by branches of the same nerve, and he came to appreciate that where the joint was inflamed the nerves were stimulated and not only gave referred pain to the skin over the joint, but also caused the muscles controlling the joint to go into a spasm, thereby proctecting the joint from further injury because of the immobilization that the spastic muscles occasioned. So fundamental was the importance of this observation that it is known now as 'Hilton's Law.' "[2]

From the time of his appointment as lecturer in 1845 until 1853 he could be seen each afternoon of the week entering the lecture room of the College at old Guy's promptly at 2 p.m. There he was known to be merciless in his firmness, insensitive to all but precision and hard work, and brusque to the point that he struck fear into the heart of the student who lacked such power of concentration. He drove himself and expected others to do likewise, and his sarcasm was biting and unspared. Yet the crowded lecture room spoke for the admiration that was paid him alike by student and colleague.

In 1860 he was made professor of anatomy and surgery of the Royal College of Surgeons, and as part of his duties in this position gave a series of lectures between the years 1860 and 1862 which were published a year later under the title of "Rest and Pain,"[1] the sixth edition of which was brought out this year. This became the crowning achievement of his life and established him as one of the great surgical teachers and thinkers of medical history.

Time has proved this classic to be no textbook in the usual sense of that word. Its author belongs to that relatively small group of men in medicine who were great doctors and teachers, and the medical student of today who reads their work is privileged to become their student. Such a book is useful today, not only for the factual knowledge that time does not alter, but also because it shows us at work a creative mind that moves from cause to effect and effect to cause with analytical power. It provides a grounding in philosophical principles upon which the evolution of science is based.

The editors quote Hilton as stating that he first taught "that Nature was inscrutably wise . . . that she was the supreme healer, and that interference by man must be directed only to giving Nature the best opportunity for fulfilling her divine purpose." They seem fearful that this teleological language does not fit into the modern mode of scientific reasoning and are inclined to apologize for this expression of his basic philosophy. This positive and purposeful thinking will remind the osteopathic reader however of another creative thinker on another continent and little short of a contemporary, who could not have been acquainted with Hilton's philosophy, but who expressed the same thinking in even more inclusive language.

1. Hilton, J.: Rest and pain. Ed. 6. J. B. Lippincott Co., Philadelphia, 1951.

2. *Op. cit.*, ref. 1, p. xvii.

A REMARKABLE DOCUMENT

Osteopathic physicians generally have but recently become aware of the significance of that branch of the government known as the Public Health Service headed by the Surgeon General of the United States. The new million dollar hospital and health unit recently dedicated at Kirksville under the Hill-Burton Act, was constructed under the administration of this service, both in its federal and state aspects, and the special grants for cancer teaching projects in our six osteopathic colleges were made by this same agency.

A quick perusal of the Annual Report[1] of the Public Health Service will give the doctor a degree of comprehension of the vast field covered by this department of the Federal Government, its accomplishments today, and its plans for tomorrow. It roots in the plans of the founding fathers having its origin in an act of Congress of July 16, 1798, and its services have expanded throughout the decades as the needs for such services grew.

The Public Health Service has set up no less a basic goal than winning a healthier world as a part of "our country's total effort for world-wide peace and freedom." There are one billion men, women, and children throughout the world who are victims of preventable disease. As a part of the Point Four program of technical assistance to these underprivileged people the Public Health Service will aid individual nations directly and will aid others indirectly through the World Health Organization which is an activity of the United Nations.

Even though its eventual goals seem far away and its horizons dim, the Public Health Service got things done in 1950. It administered $319 millions in the year, 65 per cent being allocated outside the Federal Government. The new Clinical Center for medical research at Bethesda, Maryland, is a 40 million dollar project to be completed in 1952. This 500 bed-1,000 laboratory hospital—two laboratories to every hospital bed—will research in one structure selected patients with chronic disease: cancer, heart diseases, mental conditions, metabolic disorders, and urological involvements; infectious and tropical diseases will be admitted for clinical study and treatment. The Isotope Laboratory was officially opened within the year, and is designed solely for medical research in atomic medicine. Through the state and local health agencies educational programs in local committees have been widely developed. Communicable disease control, in cooperation with regional and local health agencies, is still one of its major responsibilities. Training health personnel through research fellowships, special grants to medical and dental schools, together with preparing workers for administrative and technical positions in the nation's expanding public health program, suggests the breadth of the work of the Public Health Service.

Research accomplishments during the year in experimental biology and medicine were noteworthy. New pain-relieving drugs were discovered which offer promise as substitutes for morphine. The method by which histamine is detoxified in the body was under study, pointing up ways to control its metabolism. Potential sources of cortisone were under investigation. Studies in nutrition indicated a relationship between copper deficiency and gray hair. Diabetes in animals was demonstrated as not entirely an insulin deficiency. The use of salt solution as an emergency treatment for surgical work gave such promise as to warrant clinical study.

Microbiological research was richly productive. A standardized test has been developed for undulant fever. Effective immunization against the disease itself has been advanced another degree. Tularemia can be developed by drinking contaminated water, a serious matter in rural areas. Terramycin has proved to be the most effective drug in the treatment of amebic dysentery.

These facts only suggest the local, state, national, and world-wide effectiveness of the Public Health Service. This traditional agency must continue as it is now, a movement above politics and beyond the reach of conflicting "isms," for in itself it is a small facet of vast social forces that present themselves in every nation, and throughout the world. These forces are of the people, and they cannot be stopped. Osteopathic medicine, through its own men and institutions, should acquaint itself with the scope of the Public Health Service, study its aims, and plan for the day when our program can cooperate more fully in this great project of nation-wide and world-involving preventive medicine. Medical groups not prepared for this kind of team work will eliminate themselves. "This is a remarkable document," said one of our osteopathic leaders. It is that, and even more it demands thoughtful study at every level of our profession. It represents a wave of the future.

1. Annual Report of the Federal Security Agency, Public Health Service, 1950. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

THE NEUROPSYCHIATRIC SUPPLEMENT

This issue of THE JOURNAL carries the annual Neuropsychiatric Supplement contributed by the American College of Neuropsychiatrists. While the material contained therein was written by, and for presentation before, specialists, it deserves the attention of those in general practice and those practicing other specialties.

Of particular interest to all those who specialize should be the lead article written by Thomas J. Meyers on the training and certifying of psychiatrists in the osteopathic profession. This factual recital of the development of a group of well-trained and useful practitioners in a field where the needs are great and the workers few stands as an inspiration to all those laboring to perfect themselves and others for the practice of a specialty.

The other articles published in the Supplement are devoted to discussions of conditions which must be the concern of every physician. They comprise the surgical management of hydrocephalus by Philip B. Davis, carbon dioxide-oxygen therapy of mental disturbances by Ralph I. McRae, and the psychotherapy of sexual perversion by Anthony DiNolfo.

CASE REPORT

Toxic Psychosis Due To Artane

WILLIAM D. MILLER, D.O.
New York

Reports in the last several years have shown that trihexyphenidyl (Artane) is effective in treating Parkinson's disease.[1] Although the drug has been administered to many patients without serious toxic effects, the following case report is given to acquaint physicians with a reaction that did occur.

M. M., a 74-year-old male, was first seen on December 2, 1949. At this time his complaint was difficulty in walking due to stiffness in the lower extremities of 3 months duration. Examination disclosed a tremor at rest of the right hand, cogwheel rigidity of the upper extremities, festination in his gait, and a mask-like facies. Heart and lung findings and blood pressure were within normal limits, as were other physical findings. Eyeground examination revealed minimal sclerotic changes. Blood count and sedimentation rate were normal and results of urine and Mazzini tests were negative. A diagnosis of Parkinson's syndrome, idiopathic type, was made.

Osteopathic manipulative treatment was started three times weekly. Cervical, dorsal, and lumbar lesions were corrected where found. A great deal of spasticity affecting the temporomandibular and shoulder joints was released by appropriate manipulative treatment. Inasmuch as this patient, like many others, had a dorsal kyphosis, passive exercises to improve motion in the dorsal spine were also given. The patient progressed satisfactorily under this regime but it was felt that possibly Artane could carry him beyond this point of improvement. He was started on 4 mg. of Artane daily. This dose was increased slowly to the optimal level which in this case was 10 mg. daily. The improvement was dramatic. The patient was seen regularly at the beginning of therapy, but gradually the number of treatments was reduced to one a week. The patient's only complaint was irritation of the buccal mucosa and flatulence.

After the patient had been under this regime for about a year, his wife noted lapses of his memory and confusion. These changes were not constant or severe enough to be considered unusual for one of his advanced age. In August, 1951, the symptoms became much worse, however. The patient was markedly confused and disoriented and presented hallucinations. He could not comprehend anything that was explained to him and was extremely argumentative and disturbed. Blood count, urinalysis, nonprotein nitrogen, and blood sugar were all within normal limits. There were no startling physical findings other than hyperactive deep reflexes. It was felt that possibly the changes were of toxic origin. Accordingly Artane was discontinued. Within 48 hours improvement in the mental state was noted and after 72 hours a marked improvement occurred, the patient's wife stating that she had never seen him so alert in the past 8 months.

At the present time the patient is receiving regular osteopathic manipulative treatment and no medication. He continues to show improvement.

SUMMARY

A case report of toxic psychosis due to trihexyphenidyl (Artane) is reported. Artane is a very useful drug in the treatment of parkinsonism but like all new preparations it is not without its dangers, and one should be prepared to note them.

101 W. 55th St.

REFERENCE

1. Doshay, L. J., and Constable, K.: Artane therapy for parkinsonism. J. Am. M. A. 140:1317-1322, Aug. 27, 1949.

REGISTER OF TRAINING PROGRAMS AMERICAN COLLEGE OF OSTEOPATHIC SURGEONS (Approved—October, 1950)

At their meeting held in Des Moines in October, 1950, the Board of Governors of the American College of Osteopathic Surgeons accepted the responsibility to implement, sponsor and maintain a Register of Training Programs covering the specialty fields of Surgery, Obstetrical-Gynecological Surgery, Orthopedic Surgery, Peripheral-Vascular Surgery, Urological Surgery, and Anesthesiology.

The format and requirements for the Register of Training Programs were approved by the Board of Governors of the American College of Osteopathic Surgeons and the representatives of the American Osteopathic Board of Surgery and of the Committee on Accreditation of Postgraduate Training of the Bureau of Colleges of the American Osteopathic Association at their meetings in Chicago in July and in Des Moines in October, 1950.

The Chairman and Co-Chairman of the Membership Committee of the American College of Osteopathic Surgeons, the Chairman of the Credentials Committee and Chairman of the American Osteopathic Board of Surgery, and a representative from the Committee on Accreditation of Postgraduate Training of the Bureau of Colleges of the American Osteopathic Association, constitute the Evaluating Committee for approval of all voluntarily submitted programs. All programs voluntarily submitted for evaluation and approval by Preceptors and Trainees will be reviewed and evaluated on an individual basis by this Committee. Individual action will be taken and recommendations submitted to both the Preceptor and Trainee.

Forms for making annual application for approval of training programs will be available for distribution in January of each year. These forms must be completed and returned to the Secretary of the American College of Osteopathic Surgeons on or before **May First** *of each year.*

The Evaluating Committee will meet during the Annual Clinical Assembly of the American College of Osteopathic Surgeons to evaluate all training programs for which applications for approval were received prior to **May First.**

The secretarial work connected with the implementation of the Register of Training Programs will be provided by the office of the Secretary of the American College of Osteopathic Surgeons and the financial cost of maintaining this Register will be borne by the College.

The files of the Register of Training Programs are the property of the American College of Osteopathic Surgeons, but the contents of individual files and the information submitted will be available to the American Osteopathic Board of Surgery, the Committee on Accreditation of Postgraduate Training, and such other organization or individuals as the

Executive Committee of the American College of Osteopathic Surgeons may deem entitled to receive such information.

For the purposes of the Register of Training Programs, the physician conducting the training program will be referred to as the **Preceptor**; the physician in training under the Preceptor will be referred to as the **Trainee**; and the training program itself will be referred to as the **Preceptorship Training Program.**

As of January 1, 1951, all physicians conducting preceptorship training programs and all physicians entering such training programs on that date or thereafter must meet certain requirements.

Department of Professional Affairs

ALLAN A. EGGLESTON, D.O.
Chairman
Montreal, Canada

COMMITTEE ON SPECIAL MEMBERSHIP EFFORT

STEPHEN B. GIBBS, D.O.
Chairman
Coral Gables, Florida

IT IS YOUR PROBLEM

Those of you reading this will say to yourselves, "This nonmembership problem does not affect me—I'm a member." You are right—you are a member or you would not be reading THE JOURNAL. But you are wrong in assuming that the problem does not affect you.

The dues of the Association were increased from $50.00 to $75.00 a year by action of the last House of Delegates in July. Why? Because money was needed to carry on the expanded Association programs which you and I as members had demanded.

None of us like to pay increased dues. Avoiding future increases is a simple matter. If each member makes it his duty to see that there are no nonmembers in his district, everyone will be carrying his share of professional activities and the cost will be less to the individual. With increased income and fewer nonmembers, programs can be expanded and become more beneficial and yet there will not be the need of another dues increase.

The higher the percentage of membership we have, the more solid the front we present to the public. The more members we have, the more interest develops in our professional activities and our Association and its program.

Isn't it worthwhile to you to have this nonmember roll smaller? Don't you see the need for assisting the Committee on Special Membership Effort in its work?

May we count on your help?

DAVID E. REID, D.O.

MEMBERSHIP REPORT AS OF OCTOBER 1, 1951

Membership Count, September 1, 1951		8,146
Applications received in September, 1951	17	
Graduates licensed in September, 1951	80	97
Deaths in September, 1951	8	
Dropped from membership roll, September, 1951	1	9
Gain in September, 1951		88
Membership Count, October 1, 1951		8,234

HONOR ROLL

F. H. Bossemeyer, Jr.

Department of Public Affairs

JOHN W. MULFORD, D.O.
Chairman
Cincinnati

BUREAU OF PUBLIC EDUCATION ON HEALTH

JOHN P. WOOD, D.O.
Chairman
Birmingham, Mich.

CODE OF ETHICS, ARTICLE VI, SECTION 4

Physicians in practice are guided by the standards of conduct established by the codes of ethics of their professions and the laws and court decisions of the states in which they are licensed to practice. Oftentimes, a practice or procedure which is considered unethical under a code of ethics is not illegal under the law. In the case of commissions, however, both the code of ethics and the law prohibit them. The Code of Ethics of the American Osteopathic Association, Article VI, Sec. 4, provides:

> It is derogatory to professional character for physicians to pay or offer to pay commissions to any person whatsoever who may recommend to them patients requiring general or special treatment or surgical operations. It is equally derogatory to professional character for physicians to solicit or receive such commissions.

The relationship of physician and patient is one of unusual responsibility. It differs from the ordinary business contacts and dealings of other occupations. 70 *Corpus Juris 941 Secundum* states:

> The respective obligations and duties of a physician and patient are controlled by the peculiar relationship between them. The *relationship is one of trust and confidence;* it is a consensual relationship wherein the patient knowingly seeks the assistance of the physician and the physician knowingly accepts him as a patient; and it is the duty of the physician to exercise the utmost good faith in dealing with his patient, not only in professional matters but in all other relationships. . . . Since the relationship between a physician and his patient is confidential, all dealings between them will be closely scrutinized, particularly those inuring to the benefit of the physician.

In view of this relationship of trust and confidence, conduct accepted as legal and ethical in ordinary business dealings becomes unauthorized and illegal for the physician or where a business is dealing with physicians. In the decision in *Lilly et al v. Commissioner of Internal Revenue,* 188 F. 2d. 269, 271 (1951), the United States Circuit Court of Appeals, Fourth Circuit, quoted with approval the following statement from a decision of the New York Court of Appeals (*Meinhard v. Salman,* 249 N.Y. 458, 464):

> Many forms of conduct permissible in a workaday world for those acting at arm's length, are forbidden to those bound by fiduciary ties. A trustee is held to something stricter than the morals of the market place. Not honesty alone, but the punctilio of an honor the most sensitive, is then the standard of behavior. As to this there has developed a tradition that is unbending and inveterate.

A physician, therefore, in acting on behalf of his patient, assumes the capacity of a trustee and every aspect of his conduct on behalf of the patient must bear up to the same high standards required by law of a trustee. Physicians have not ordinarily been aware of this legal status.

In some states the giving of commissions and rebates or similar conduct has been specifically prohibited by law. Cali-

fornia Business and Professions Code, Sec. 650 applicable to all professions provides:

> The offer, delivery, receipt or acceptance, by any person licensed under this division of any unearned rebate, refund, commission, preference, patronage dividend, discount, or other unearned consideration, whether in the form of money or otherwise, as compensation or inducement for referring patients, clients, or customers to any person, irrespective of any membership, proprietary interest or co-ownership in or with any person to whom such patients, clients or customers are referred is unlawful.

In other states not having such a provision in the law, "unprofessional, dishonorable, or immoral conduct" are made a basis for revocation of a license. In the absence of statutory definitions, what constitutes unprofessional conduct or dishonorable or immoral conduct is determined by those standards which are commonly accepted by those practicing in the same profession in the same territory. The standards of conduct accepted by a profession in all areas include the code of ethics of the profession, hence under such statutes the giving of commissions or such practices would be unlawful. In the case of *Matter of Cherry v. Board of Regents,* 289 N. Y. 148, 158 (1942), the New York Court of Appeals stated in regard to what constitutes "unprofessional conduct":

> . . . The standards of conduct generally accepted by practitioners in the State of New York are not so indefinite that they cannot be determined by qualified persons. They are part of the ethics of the profession and "what is generally called the 'ethics' of the profession is but the consensus of expert opinion as to the necessity of such standards". . . . Every member of the profession should be regarded as an expert for such purpose. There is a moral dereliction in failure by any member of a profession to apply in professional practice the standards which, by consensus of opinion in the profession, are necessary.

Thus, it is clear and certain that whether made so by statute directly or indirectly, the giving of commissions is an unlawful practice and is unprofessional conduct as a matter of law.

In the *Lilly* case, the Circuit Court of Appeals had before it for review a decision of the Tax Court of the United States which had disallowed, as an "ordinary and necessary" business expense of an optical company, rebates paid by the company to physicians who had referred patients to the company for glasses. The evidence showed that the physicians did not inform their patients of this rebate arrangement, but that such disclosure was made only when it was specifically requested by individual patients. The court stated that it would not:

> . . . lend the force of any opinion of this court to sanction, as an "ordinary and necessary" expense . . . the making and carrying out of such unconscionable and reprehensible contracts for secret kickbacks to a doctor.

Not being an "ordinary and necessary" business expense, the optical company was required to include such sums within its adjusted gross income. The physicians, of course, were taxed individually on the rebates received by them. The court stated:

> A doctor owes the duty of undivided loyalty to his patients, and a contract which violates this duty is unenforceable and opposed to public policy. *One cannot at the same time serve two incompatible masters.*

It listed the corrupt practices which a rebate system tends to promote as:

> (1) the prescription by the doctor of glasses where not actually necessary; (2) more expensive lenses than really needed; (3) recommendation of an inferior optician; (4) artificial increase in the cost of glasses by the inclusion of the physician's commission, for which the physician affords no value to the patient. The bait of the secret consideration, which taxpayers offered to the doctor, hopelessly divides the trust interest of the doctor.

The decision in the *Lilly* case is one of considerable importance because it is a legal enunciation that a system of commissions or rebates is against public policy and that anyone giving them may not classify them as "ordinary and necessary" business expenses.

The decisions in cases involving such practices appear to rest upon two evidentiary facts: (1) the rebates or commissions are unearned and (2) they are secret. Since a physician is in a relationship of trust and confidence with his patients, a full disclosure of all information and facts acquired while acting on their behalf is required. All dealings between them will be closely scrutinized. The courts hold that a physician may not benefit at the expense of the patient where services have not been provided the patient and where the patient has not been informed that the physician is being compensated.

The legal decisions thus support the provisions of the codes of ethics regulating the conduct of physicians. Article VI, Sec. 4 of the Code of Ethics of the American Osteopathic Association reiterates what the courts have considered to be a part of the public policy of the country.

COMMITTEE ON CHRISTMAS SEALS

STEPHEN M. PUGH, D.O.
Chairman
Everett, Washington

THE TWENTY-FIRST CHRISTMAS SEAL CAMPAIGN

November first saw the launching of the 1951-52 Christmas seal campaign, the twenty-first in its history. The seal itself, which repeats last year's design in different colors, has gone to every member of the profession and the Auxiliary. With it has gone a letter stating its annual cause, a leaflet briefly outlining the needs and aims of research, an order form, and a return envelope. This material has been carefully and thoughtfully prepared and serves as an index to the plans and hopes of the Committee on Christmas Seals—that the campaign bring research and education the monetary support so vitally needed and richly deserved.

Publicity has gone out to the press; articles are appearing in the bulletins and magazines of the Association of Osteopathic Publications; the *A.A.O.A. Record* is repeating its generous gesture of printing the seal, in color, on its December cover, and its September issue carried the campaign story as it relates to the very effective Auxiliary participation.

All these things have set the stage. The campaign has been launched. Its goal has been set at $40,000. Now comes the carry-through. That depends upon the men and women in the field. Without the cooperation of each person in the profession and the Auxiliary, all this preparation and launching become mere paper work.

To insure success, the Committee asks two things of each member of the profession: first, make a contribution in return for the seals received; second, use the order form to get more seals to distribute to patients and friends, and thus elicit further contributions. The goal will be reached through individual effort.

As a background for thinking, the Committee asks that each member realize that the Christmas seal campaign now is a greatly expanded Association activity—expanded by the ever-growing value and need for research and education. Since 1949, when the Board of Trustees voted to divide the campaign returns between the research and student loans, the tempo has been accelerated. Because research's needs are urgent and its opportunities stupendous, the needs of the seal campaign have become urgent and stupendous.

The penny-per-seal contribution is no longer morally or financially enough. No member should consider his or her donation *enough* unless it adequately reflects his cognizance of research's importance to the profession's continued development.

Nor is the student loan cause being forgotten. The termination of loans to veterans has increased materially the applications for osteopathic loans. At the Fall meeting of the Committee on Student Loan Fund, fifteen juniors and seniors in osteopathic colleges were aided. Thus fifteen more persons were permitted to finish the training that will allow them to join the ranks of a profession fighting to improve public health.

Aside from its tangible returns, no member should overlook the publicity value of the Christmas seal. It is an effective and long-time publicity agent. On each piece of mail, it carries a message of hope. Displayed in one's office, along with the highly effective 1951 table poster, it opens the way for discussion of research and education. The research leaflet, sent with every sheet of seals, reflects the scope of the osteopathic concept.

This is the 1951 Christmas seal campaign, its coming-of-age campaign. It awaits your action. It deserves success. It expects success.

Department of Public Relations

CHESTER D. SWOPE, D.O.
Chairman
Washington, D. C.

SELECTIVE SERVICE REGULATIONS

Executive Order 10292 dated September 25, 1951, revised the Selective Service regulations relating to classification rules and principles. As so revised, the occupational (Class II) and dependency (Class III) deferment regulations are reproduced below:

CLASS II

1622.20 General Rules for Classification in Class II.—(a) On the local board is placed the responsibility, under applicable rules and regulations, of deciding which men should be deferred because of their civilian activities. It is in the national interest and of paramount importance to our national security that civilian activities which are contributing to the national health, safety, or interest should be disrupted as little as possible, consistent with the fundamental purpose of title I of the Universal Military Training and Service Act, as amended.

(b) No deferment from training and service shall be made in the case of any individual except upon the basis of the status of such individual.

(c) The local board may avail itself of the assistance of all Federal, State, or local agencies to obtain information which will help it to determine whether a claim for occupational deferment should be granted.

(d) No local board, appeal board, or other agency of appeal of the Selective Service System shall be required to postpone or defer any person by reason of his activity in study, research, or medical, dental, veterinary, optometric, osteopathic, scientific, pharmaceutical, chiropractic, chiropodial, or other endeavors found to be necessary to the maintenance of the national health, safety, or interest solely on the basis of any test, examination, selection system, class standing, or any other means conducted, sponsored, administered, or prepared by any agency or department of the Federal Government or any private institution, corporation, association, partnership, or individual employed by an agency or department of the Federal Government.

1622.21 Length of Deferments in Class II.—(a) Class II deferments shall be for a period of one year or less. If there is a change in the registrant's status during the period of deferment in Class II, his classification shall be reopened and considered anew.

(b) At the expiration of the period of a registrant's deferment in Class II, his classification shall be reopened and he shall be classified anew in the manner provided in part 1625 of this chapter. The registrant may be continued in Class II for a further period of one year or less if such classification is warranted. The same rules shall apply when classifying a registrant at the end of each successive period for which he has been classified in Class II.

(c) Nothing in this section shall be construed to require the local board to retain in Class II any registrant when the reason for his occupational classification has ceased to exist.

1622.22 Class II-A: Registrant Deferred Because of Civilian Occupation (Except Agriculture and Activity in Study).—In Class II-A shall be placed any registrant whose employment in industry, or other occupation or employment, or whose continued service in office (other than an office described in section 1622.41) under the United States, or any State, Territory, or possession, or the District of Columbia, or whose activity in research, or medical, scientific, or other endeavors is found to be necessary to the maintenance of the national health, safety, or interest.

1622.23 Necessary Employment Defined.—(a) A registrant's employment in industry or other occupation, service in office, or activity in research, or medical, scientific, or other endeavors, shall be considered necessary to the maintenance of the national health, safety, or interest only when all of the following conditions exist:

(1) The registrant is, or but for a seasonal or temporary interruption would be, engaged in such activity.

(2) The registrant cannot be replaced because of a shortage of persons with his qualifications or skill in such activity.

(3) The removal of the registrant would cause a material loss of effectiveness in such activity.

(b) The President may, from time to time (1) designate special categories of occupation, employment, or activity essential to the national health, safety, or interest; and (2) prescribe regulations governing the deferment of individual registrants engaged in such occupations, employments, or activities.

1622.25 Class II-S: Registrant Deferred Because of Activity in Study.—(a) In Class II-S shall be placed any registrant whose activity in study is found to be necessary to the maintenance of the national health, safety, or interest.

(b) A registrant's activity in study may be considered to be necessary to the maintenance of the national health, safety, or interest when any of the following conditions exist:

(1) The registrant (i) was accepted on or before July 1, 1951, for admission by a graduate school to the class next commencing for a full-time course of instruction as a candidate for a graduate degree and, if such class has commenced, has entered upon such course, or (ii) is a graduate student seeking a graduate degree and is pursuing a full-time course of instruction in a graduate school to which he was admitted on or before July 1, 1951, and (iii) the graduate school at which he is in attendance has certified that he currently is meeting degree requirements and is expected to attain his degree.

(2) The registrant (i) was accepted on or before July 1, 1951, for admission by a professional school of medicine, dentistry, veterinary medicine, osteopathy, optometry, pharmacy, chiropractic, or chiropody to the class next commencing and, if such class has commenced, has entered such school, or (ii) is a student in any such professional school to which he was admitted on or before July 1, 1951, and (iii) the school at which he is in attendance has certified that he is satisfactorily pursuing a full-time course of instruction leading to his graduation.

(3) The registrant (i) has been accepted after July 1, 1951, for admission by a graduate school to the class next commencing for a full-time course of instruction as a candidate for a graduate degree and, if such class has commenced, has entered upon such course, and (ii) in his last full-time undergraduate academic year at a college, university, or similar institution of learning achieved a scholastic standing on that year's work which ranked him for that year within the upper one-half of the full-time male students in his class or has attained a score of 75 or more on the qualification test prescribed by the Director of Selective Service pursuant to paragraph (c) of this section, and (iii) the graduate school at which he is in attendance has certified that he currently is meeting degree requirements and is expected to attain his degree.

(4) The registrant (i) has been accepted after July 1, 1951, for admission by a professional school of medicine, dentistry, veterinary medicine, osteopathy, optometry, pharmacy, chiropractic, or chiropody to the class next commencing and, if such class has commenced, has entered such school, and (ii) in his last full-time academic year at a college, university, or similar institution of learning prior to his entrance into such professional school achieved a scholastic standing on that year's work which ranked him for that year within the upper one-half of the full-time male students in his class or has attained a score of 70 or more on the qualification test referred to in subparagraph (3) of this paragraph, and (iii) the school at which he is in attendance has certified that he is satisfactorily pursuing a full-time course of instruction leading to his graduation.

(5) The registrant has been pursuing a course of instruction which requires the completion of either five, six, or seven years of full-time undergraduate study to qualify him for the first academic degree and has successfully completed his fourth, fifth, or sixth year, as the case may be, at a college, university, or similar institution of learning and in his last completed undergraduate year achieved a scholastic standing on that year's work which ranked him for that year within the upper three-fourths of the full-time male students in his class or has attained a score of 70 or more on the qualification test referred to in subparagraph (3) of this paragraph, and has been accepted for admission by a college, university, or similar institution of learning to the fifth-year, sixth-year, or seventh-year class next commencing for a full-time course of instruction or has entered upon and is satisfactorily pursuing such course.

(6) The registrant has successfully completed his third year at a college, university, or similar institution of learning and achieved a scholastic standing on his third year's work which ranked him for that year within the upper three-fourths of the full-time male students in his class or has attained a score of 70 or more on the qualification test referred to in subparagraph (3) of this paragraph, and has been accepted for admission by a college, university, or similar institution of learning to the fourth-year class next commencing for a full-time course of instruction or has entered upon and is satisfactorily pursuing such course.

(7) The registrant has successfully completed his second year at a college, university, or simi'ar institution of learning and achieved a scholastic standing on his second year's work which ranked him for that year within the upper two-thirds of the full-time male students in his class or has attained a score of 70 or more on the qualification test referred to in subparagraph (3) of this paragraph, and has been accepted for admission by a college, university, or similar institution of learning to the third-year class next commencing for a full-time course of instruction or has entered upon and is satisfactorily pursuing such course.

(8) The registrant has successfully completed his first year at a college, university, or similar institution of learning and achieved a scholastic standing on his first year's work which ranked him for that year within the upper one-half of the full-time male students in his class or has attained a score of 70 or more on the qualification test referred to in subparagraph (3) of this paragraph, and has been accepted for admission by a college, university, or similar institution of learning to the second-year class next commencing for a full-time course of instruction or has entered upon and is satisfactorily pursuing such course.

(c) The Director of Selective Service is authorized to prescribe such qualification test or tests as he may deem necessary for carrying out the provisions of paragraph (b) of this section and to prescribe the procedures for the administration of such test or tests, for the

(Continued on page 200.)